STATE OF CONNECTICUT

Proposed Amendment
to the
State Solid Waste Management Plan
July 2006

Gina McCarthy, Commissioner

State of Connecticut
Department of Environmental Protection
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Acknowledgement

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PROPOSED AMENDMENT TO THE STATE SOLID WASTE MANAGEMENT PLAN

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Introduction

The Connecticut Department of Environmental Protection ("CT DEP") is amending the State Solid Waste Management Plan in accordance with Section 22a-228 of the Connecticut General Statutes ("CGS"). It replaces the State Solid Waste Management Plan that was adopted in 1991. CGS Section 22a-229 requires that "after adoption of a state-wide solid waste management plan pursuant to section 22a-228, any action taken by a person, municipality or regional authority that is governed by this chapter shall be consistent with such plan." Since the adoption of the 1991 Plan, solid waste management has changed dramatically from mainly a state and local issue, to one that is now increasingly a regional, national, and global issue.

This new Plan will serve as the basis for Connecticut's solid waste management planning and decision making for the period 2005 through 2024. The Plan addresses a wide range of solid wastes, focusing primarily on municipal solid waste (or MSW, what is commonly considered household and commercial trash) and debris resulting from construction, demolition (C&D waste). Though some other special wastes are addressed, hazardous wastes are not covered. The Plan examines the existing state of solid waste management in Connecticut, identifies the problems that exist and the barriers to solving those problems, sets out a vision and goals to be achieved in Connecticut and proposes strategies to achieve the vision. Within the immediate five year period, Connecticut will focus on implementing the higher priority strategies listed in the Plan.

In developing this Plan, the Department worked extensively with the public and the specially created CT DEP Solid Waste Management Plan External Stakeholders Committee. The Committee members represented government, the public, non-governmental organizations, and businesses that had interest in solid waste management issues in the State. Implementing the Plan will involve all the citizens of Connecticut to address the solid waste issues facing the State and will require not only changes in personal and business practices, but also legislative changes and increases in funding at the State, regional, and local levels to support new and expanded solid waste management programs.

Vision Statement and Goals for Managing Connecticut's Solid Waste

Connecticut's long-range vision for solid waste management is to:

- Significantly transform our system into one based on resource management through collective responsibility for the production, use, and end-of-life management of products and materials in the State;

- Shift away from the "throwaway society," toward a system that promotes a reduction in the generation and toxicity of trash, and where wastes are treated as valuable raw materials and energy resources, rather than as useless garbage or trash; and
- Manage wastes through a more holistic and comprehensive approach than today's system, resulting in the conservation of natural resources and the creation of less waste and less pollution, while supplying valuable raw materials to boost manufacturing economies.

The goals of the State Solid Waste Management Plan are:

- Goal 1: Significantly reduce the amount of Connecticut generated solid waste requiring disposal through increased source reduction, reuse, recycling and composting.
- Goal 2: Manage the solid waste that requires disposal in an efficient, equitable and environmentally protective manner, consistent with the statutory solid waste hierarchy.
- Goal 3: Adopt stable, long-term funding mechanisms that provide sufficient revenue for state, regional and local programs while providing incentives for increased waste reduction and diversion.

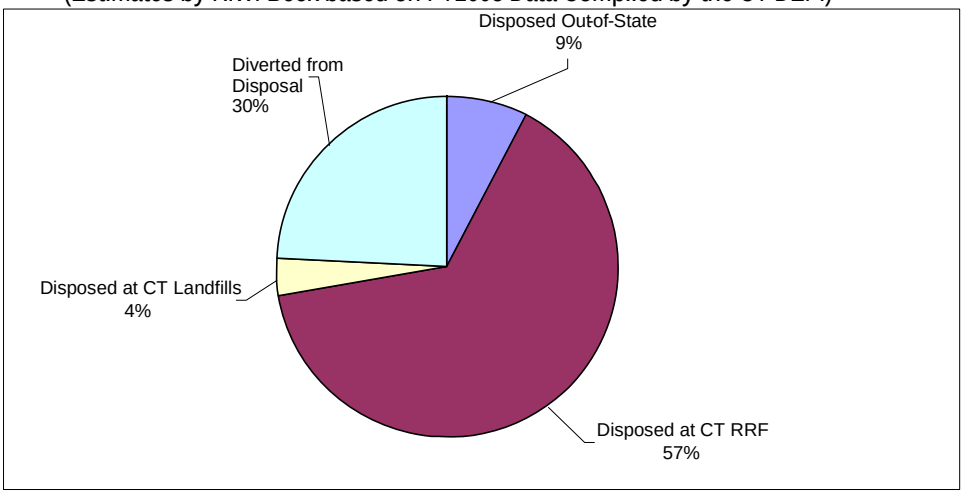
Current Status Of Solid Waste Management

Connecticut has formally adopted an integrated waste management hierarchy as a guiding framework for solid waste management efforts. Connecticut's system adheres to this hierarchy by emphasizing source reduction, recycling, composting, and energy recovery from solid waste, while relying on landfill disposal as a last resort.

MSW

As shown in Figure 1, in FY2005 approximately 30 percent of the municipal solid waste (MSW) generated was recycled; 57 percent was burned at six regional Resource Recovery Facilities (RRFs); nine percent was disposed out of state; and four percent was disposed at in-state landfills. Connecticut is more reliant on waste to energy facilities than any other state in the country. This reliance on RRFs results in a significant reduction in the volume of waste ultimately needing disposal, plus significant amounts of ash residue requiring disposal in lined landfills.

Figure 1. Management of Connecticut MSW, FY 2005.
Estimated Total of MSW Generated for FY2005 is 3,805,000 tons.
(Estimates by R.W. Beck based on FY2003 Data Compiled by the CT DEP.)



Over the past decade, Connecticut has become more reliant on out-of-state disposal options for MSW. Since 1994, out-of-state disposal of Connecticut MSW has increased from approximately 27,000 tons to 327,000 tons in 2004. This raises issues regarding inconsistency with the statutory hierarchy, and increased risk due to cost fluctuations and availability.

Through recycling efforts in Connecticut, MSW recycling rates have increased from only a few percent before recycling became mandatory in 1991 to almost 30 percent of the waste generated in FY2005. Composting of yard wastes (leaves and brush) and grasscycling have been successful in Connecticut at both diverting waste from disposal and yielding useful end products. However composting of other materials has been less successful and consequently, composting in general remains significantly under-utilized in Connecticut. Although recycling and composting have been successful in Connecticut, recycling efforts have stagnated over the last several years, while at the same time the population and per capita waste generation rates have increased. As a result, Connecticut faces an increasing need for disposal capacity at a time when available land is in shorter supply, construction and operating costs are higher, and the public is less willing to accept additional waste disposal facilities.

RRF Ash Residue

The six MSW RRFs in the State generate an average of approximately 551,000 tons per year of ash residue. Two landfills in the State are permitted to accept and dispose of ash residue. The Connecticut Resources Recovery Authority (CRRA) ash landfill in Hartford is estimated to reach capacity and close in October 2008. The Wheelabrator ash landfill in Putnam is estimated to reach capacity and close by mid FY2019 (based on a number of assumptions that are detailed in the Plan including the following: that the Wallingford RRF closes in 2009; that no new RRF capacity is built in Connecticut; that the other Connecticut RRFs continue to operate; and that the Bristol RRF starts

sending its ash residue to the Putnam ash landfill after June 2008, when it's current contract with a NYS landfill expires).

Construction and Demolition Waste (C&D)/Oversized MSW (Oversized MSW includes bulky items such as carpets, furniture, mattresses)

Currently, most of the Connecticut C&D /Oversized MSW is disposed, with only about 7 percent of Connecticut C&D waste reported recycled. C&D waste recycling occurs at a much higher level in many other states as compared to Connecticut. Connecticut's low recycling rate, coupled with a severe lack of disposal capacity in Connecticut for C&D related waste, results in most of Connecticut's C&D waste being disposed at out-of-state landfills. In FY2004, in-state C&D volume reduction facilities ("VRFs") and transfer stations ("TSs") reported sending approximately 909,000 tons of Connecticut generated C&D waste to out-of-state landfills for disposal. All but one of the 24 remaining active bulky waste landfills are municipally owned and most serve only their communities, with many expected to close soon.

Special Waste—Electronics

A special waste category of increasing concern is electronic waste. Our reliance on computers and other electronic devices, and the continuing advances in technology, have created a huge increase in the volume of these materials being disposed. Efforts have been undertaken to develop a consistent national approach to dealing with this issue, but no consensus has been reached. As a result, recycling of electronic waste in this State has been limited to those few manufacturers willing to take back old products, and those few municipalities and authorities willing to conduct costly collection programs.

In addition to electronic wastes, the Plan discusses other types of special waste. These include land clearing debris, household hazardous wastes, animal mortalities, road wastes, contaminated soils, dredge materials, sewage sludge, disaster debris, waste treated wood, and waste sharps and pharmaceuticals.

Projections for MSW, C&D and RRF Ash Residue

In updating Connecticut's Solid Waste Management Plan, four broad scenarios were considered:

1. Maintain the current 30 percent diversion rate for MSW and 7 percent diversion rate for C&D waste/Oversized MSW.
2. Increase the current MSW diversion rate from 30 percent to 40 percent and maximize the C&D waste/Oversized MSW diversion from disposal. Since data regarding the generation of C&D waste/oversized MSW is incomplete, it is difficult to set a specific goal for reducing the amount of such waste requiring

disposal but efforts will be made to maximize the diversion of this waste from disposal.

3. Increase the current MSW diversion rate from 30 percent to 49 percent in 2024 and maximize the C&D waste/Oversized MSW diversion from disposal.
4. Achieve a 61 percent MSW diversion rate by 2024 and eliminate the projected in state disposal capacity shortfall by FY2024. The Department recognizes that this goal would be very difficult to achieve, within the twenty-year planning period of this Plan.

Scenarios one, two, and three would result in an MSW and C&D waste/Oversized MSW disposal capacity shortfall, without the development of any new in-state disposal capacity. That is, Connecticut would not have enough disposal capacity in state to manage the MSW or the C&D waste/Oversized MSW generated in the State.

Unless Connecticut can successfully divert more waste from disposal, the in-state disposal capacity shortfall for both MSW and C&D waste/Oversized MSW will grow as depicted in figures 2 and 3. Figure 2 shows the projections of in-state MSW capacity shortfall under various waste diversion assumptions (diversion maintains 30 percent; diversion reaches 40 percent and 49 percent) for the period FY2005 through FY2024. Figure 3 shows the projections of in-state C&D waste/Oversized MSW disposal capacity shortfall under various waste diversion assumptions (diversion remains at 7 percent; diversion reaches 40 percent and 49 percent) for the period FY2005 through FY2024.

Based on a number of assumptions detailed in the Plan (including that the Wallingford RRF closes in 2009; that no new RRF capacity is built in Connecticut; that the other Connecticut RRFs continue to operate; and that the Bristol RRF starts sending its ash residue to the Putnam ash landfill after June 2008), it is projected that in-state disposal capacity for MSW RRF ash residue will be sufficient to meet the needs of all the State's RRF ash residue generated through mid-FY2019. Figure 4 shows the projections of in-state MSW RRF ash residue disposal capacity shortfall for the period FY2005 through FY2024.

Figure 2
Projections of In-State MSW Disposal Capacity Shortfall Under Various Waste Diversion Assumptions for the Period FY2005 through FY2024.

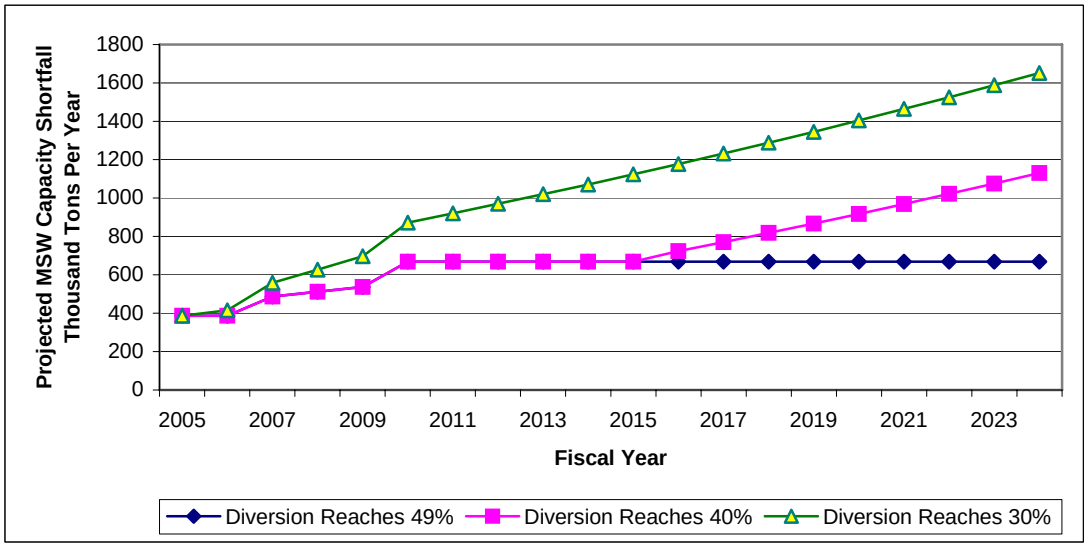


Figure 3.
Projections of In-State C&D Waste/Oversized MSW Disposal Capacity Shortfall Under Various Waste Diversion Assumptions for the Period FY2005 through FY2024.

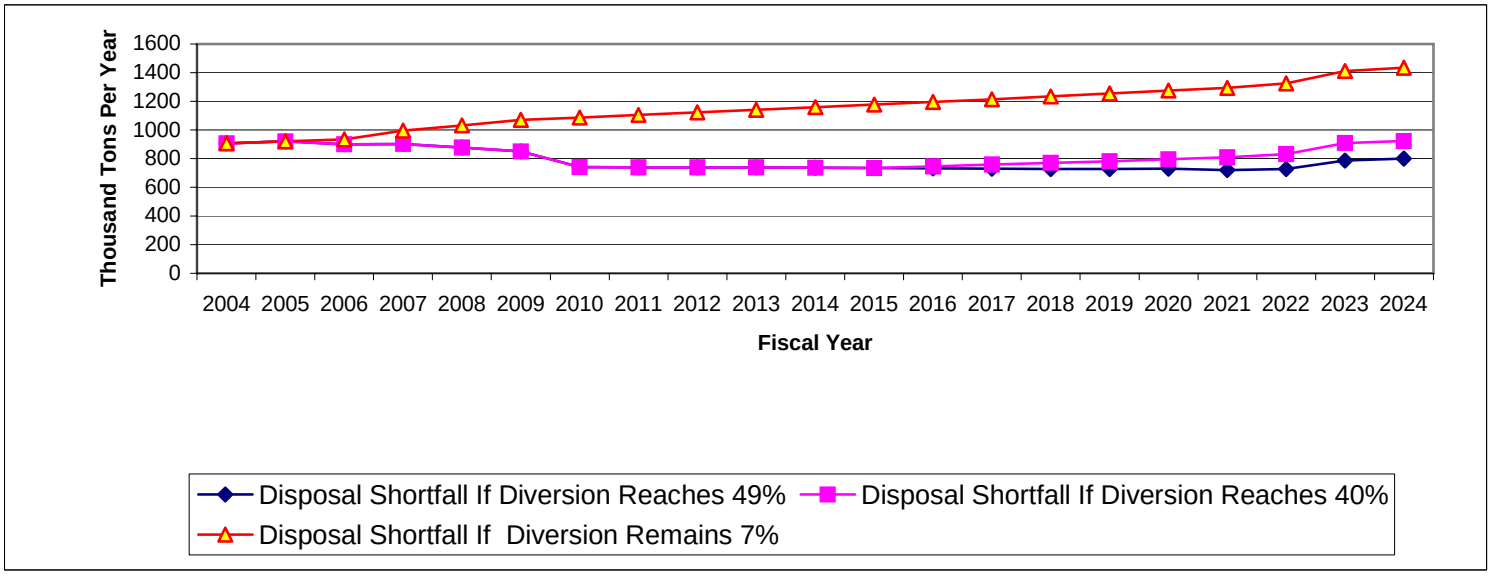
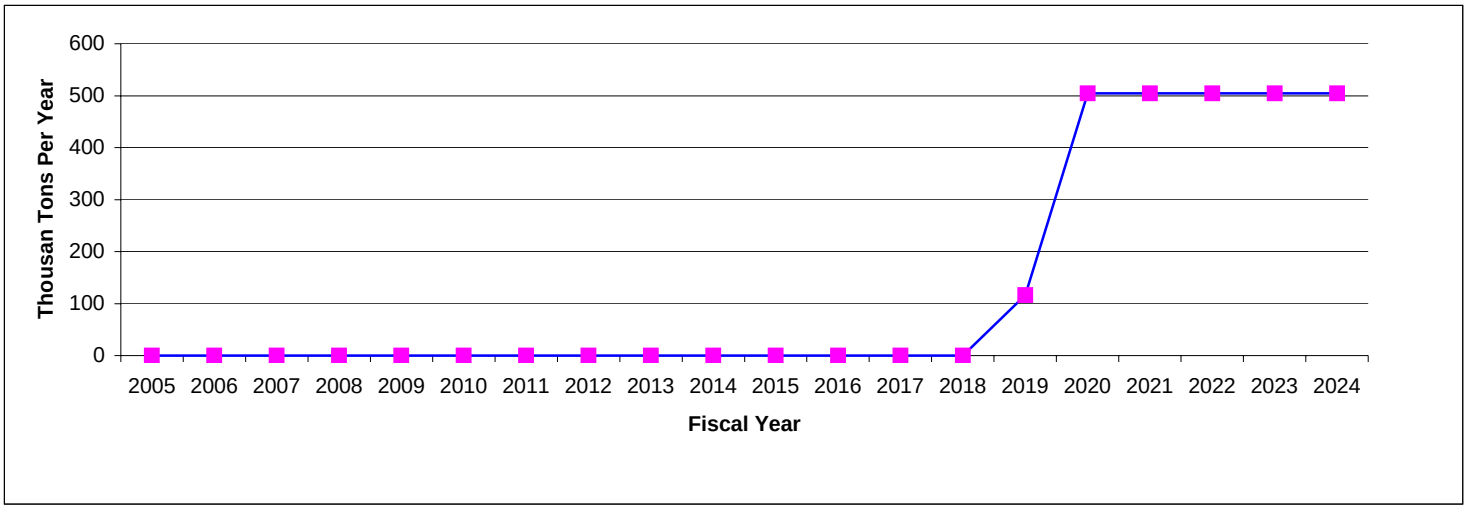


Figure 4
Projections of In-State MSW RRF Ash Residue Disposal
Capacity Shortfall for the Period FY2005 through FY2024.



Key Factors Affecting Solid Waste Management in Connecticut

The context for solid waste management in Connecticut has changed substantially since the last statewide solid waste management plan was adopted in 1991. Among the key issues that will shape solid waste management in coming years are:

- Connecticut is projected to have an increasing shortfall of MSW in-state disposal capacity.
- There is increasing out-of-state capacity for solid waste disposal at competitive prices.
- Solid waste is a commodity subject to inter-state commerce laws.
- Bonds that financed the construction of the RRFs will be paid off, and municipal contracts to supply MSW to Connecticut's RRF facilities will expire over the next ten years.
- Recycling and solid waste management services are increasingly privately run and market- driven.
- Connecticut's waste diversion infrastructure is stagnant and State and municipal funding is inadequate to support and achieve increased source reduction, reuse, recycling, and composting.
- Nationally, recycling of non-traditional material streams has grown significantly.
- National and global recycling markets have grown substantially.

- Other states and communities have demonstrated an ability to achieve higher waste diversion rates than Connecticut.
- There is growing interest in product stewardship and producer responsibility policies.

Major Recommendations

Source Reduction, Recycling, Composting

The recommendations regarding source reduction, recycling and composting represent the centerpiece of this Plan. After rapid growth in the early to mid 1990s, Connecticut's recycling efforts have become stagnant and are in need of reinvigoration. The strategies presented in this plan, at a minimum, look to maintain the current amount of MSW disposed annually by reducing our per capita disposal rate from 0.76 tons/ person/year in FY2005 to 0.73 tons/person/year in FY2024 by achieving at least a 49 percent MSW disposal diversion rate by FY2024. Aggressive efforts must be undertaken if the goals of the Plan are to be reached. While much of the burden of accomplishing this will fall on the Department, a greater amount will necessarily be borne by municipalities and businesses (that generated C&D waste). Significant increases in funding will be needed to support these efforts.

The State must also take advantage of increasing demand for recycled waste materials, especially in overseas markets, to facilitate the development of a more robust recycling business infrastructure in Connecticut. This applies to almost all materials including paper, metals, electronics and compostable organics. Significant results can be achieved through increased efforts to compost institutional food wastes, as is being done in other states. Increased education on the systems and methods that are available will also be needed to meet the State's goals. In order to reduce the amount and toxicity of waste being generated in the first place, Connecticut must focus more effort on packaging. The State will continue to work with the Toxics in Packaging Clearinghouse to enforce existing laws and encourage producers to reduce the amount and toxicity of packaging being used.

Disposal Capacity

There is not enough disposal capacity in Connecticut to handle all waste generated in the State. This is true for the major components of the solid waste stream: MSW and C&D waste. Past plans have been premised on the policy that the State should be "self-sufficient" in waste disposal capacity, meaning that there should be enough capacity in Connecticut to handle all waste generated in the state. The establishment over the last few years of significant volumes of out of state landfill capacity at competitive prices has changed the picture dramatically. This Plan recognizes that the State should strive to be self-sufficient and that such an approach represents good public policy. The Plan emphasizes that significant reduction must be achieved in the amount of waste disposed as the primary means of achieving self-sufficiency. It is the intent of this Plan to stimulate discussion and further debate on this issue.

Public or Private Ownership and Control

Another key issue is whether or not the RRF capacity in Connecticut and the RRF ash residue landfill capacity in Connecticut, will be owned and controlled by public or private entities. Bonds that financed the construction of the RRFs will be paid off over the next few years and contracts for disposal at the RRFs will expire over that same time. Further, the Hartford landfill, where CRRA sends the ash generated at the Hartford RRF, will be closing in a few years, leaving one privately owned ash residue landfill in Connecticut. These events will open the door to a major shift in control of the majority of the disposal capacity in the State from public to private entities. Private owners will be free to enter into contracts with out of state generators for some of the existing capacity that today is used by Connecticut's municipalities. While this Plan does not advocate for or against private ownership, it does urge the State's decision-makers to take note of the issue, fully debate it, and make the prudent decisions necessary to ensure that the interests of Connecticut's citizens and businesses are protected.

Planning, Evaluation and Measurement

This Plan replaces the last Plan adopted by the Department fifteen years ago in 1991. That is clearly too much time between plan revisions, and one of the recommendations of this Plan is that the Department regularly identify the critical solid waste issues facing the State and make appropriate revisions to this Plan. In order to ensure that these efforts are comprehensive and reflect diverse views, the Department will form a standing Solid Waste Advisory Committee, consisting of many of the interests that the Department worked with to develop this Plan. Finally, rather than expecting 169 towns to prepare their own plans as envisioned by existing law, the Department should ensure that its planning efforts thoroughly evaluate and reflect municipal accomplishments, needs and trends. Data is critical to perform these evaluations and this will require changes to existing municipal reporting requirements so they are less burdensome and more meaningful.

Permitting and Enforcement

In the public process prior to drafting this Plan, many urged the Department to streamline its permitting processes, especially for those activities that support the goals of this Plan such as increased recycling and composting. The Department agrees with these suggestions, and this Plan makes several recommendations for improving the permitting process. Some of the most significant recommendations are as follows:

- Make review of applications for recycling, composting and other beneficial facilities a high priority for the permit program;
- Develop fact sheets, model permits and other helpful materials for prospective permit applicants;
- Form a review team whose primary responsibility will be to review applications for beneficial activities;

- Establish streamlined methods of regulating waste haulers in order to incorporate reporting and other substantive requirements, along with a simple means of assessing the solid waste fee; and
- Evaluate the option of reducing permitting requirements for the beneficial reuse of certain waste materials.

It is recognized that the Department must make enforcement a high priority, and the Plan includes recommendations for accomplishing this task. In addition, recognizing that most of the potential for improvement in recycling rates exists in the municipalities, recommendations are made to increase the level of enforcement at the local level, using existing authorities. The Department will work with municipalities to identify barriers to accomplishing this, and will partner with municipalities to take appropriate enforcement actions.

Funding

This Plan charts an aggressive course for meeting the challenges of managing Connecticut's solid waste over the 20 year planning period. Action is recommended through the implementation of more than seventy strategies over the next several years to deal with these difficult issues. As with many other important programs, addressing these needs will require significant support in the form of funding at the local, state and regional level.

One of the most difficult, but clear, challenges that face decision makers and the citizens of Connecticut is to find the resources for these programs when other critical needs are competing for the same limited public dollars. Some funding sources have already been considered in the past such as capturing the unclaimed bottle and can deposits (escheats). As the public, legislators and other officials make decisions on which strategies will be implemented appropriate sources of funding must be identified. The following are the specific potential funding sources identified in this Plan:

- Capture some or all of the escheats;
- Expand the Solid Waste Assessment to all disposed solid waste, including all MSW, C&D debris, and oversized MSW, whether disposed in-state or out-of-state;
- Increase the Solid Waste Assessment beyond the present $1.50 per ton;
- Direct enforcement penalties to a special account for distribution to municipalities and regional authorities aimed at recycling; and
- Bond funds for infrastructure to support demonstration projects and/or development of publicly controlled recycling facilities.

Without adequate funding many of the critical needs identified in this Plan will not be met. It is up to all citizens of Connecticut to fully debate these issues and make the decisions necessary to properly manage the solid waste that we generate.

Statutory Changes Needed

Many of the changes needed to meet the goals of this Plan cannot be implemented without action by the legislature to change Connecticut's solid waste statutes, and possibly other areas of the law such as those affecting taxes and revenue. The following are some of the more significant recommendations identified in this Plan that will require statutory change:

1. Establishment of a recycling program for electronics;
2. Increased funding sources such as expansion of the Solid Waste Assessment, capturing the unclaimed bottle and can deposits (escheats), use of penalty money for solid waste programs, etc., along with authority to pass adequate funding along to municipalities and regional entities;
3. Prohibition on disposal of unprocessed construction and demolition waste;
4. Addition of plastics #1 and #2, and magazines, to the list of mandated recyclables;
5. Tax incentives to encourage business to create or expand activities that will move the State forward in meeting its waste diversion goals;
6. Permit program changes;
7. Expansion of the bottle bill to include plastic water bottles, and an increase in the deposit to ten cents;
8. Requirement of liners for all new C&D/Oversized MSW/Bulky waste landfills; and
9. Comprehensive alignment and updating of solid waste management laws.

Critical Issues for Decision Makers

The issues raised in this Plan present significant challenges to Connecticut's citizens, businesses and government leaders. Many critical decisions must be made over the next several years in order to successfully meet those challenges. The most critical issues or decisions, and those who will need to help address them, are outlined below:

State Legislators

- Adopt a more aggressive state goal for recycling and source reduction;
- Find ways to help fund the actions outlined in this plan, and support those needing additional resources including state agencies, regional authorities, and municipalities;
- Evaluate the role of CRRA given the changing conditions in the State with regards to the RRFs and the changing and complex nature of managing the solid waste stream;
- Expand authority allowing state agencies, regional authorities and municipalities to more effectively manage and regulate solid wastes;

- Help define what role government entities should play in directly managing the solid waste management infrastructure;
- Establish prohibitions on certain practices that contribute to increased risk to human health and the environment;
- Expand recycling mandates; and
- Establish incentives to encourage expansion and creation of new recycling and composting infrastructure.

Local Officials

- Continue to play an active role in the proper and efficient management of solid waste in their communities;
- Expand recycling programs and efforts;
- Increase enforcement of local recycling ordinances;
- Enact ordinances to reflect new State programs; and
- Change purchasing practices to create less waste and purchase environmentally preferable products.

Department of Environmental Protection

- Serve as a model for other governmental entities, businesses and citizens to enhance source reduction, composting, recycling and buying environmentally preferable products;
- Maximize resources to support and maintain education, assistance, recycling, permitting, and enforcement;
- Establish a standing Solid Waste Advisory Committee; and
- Establish permitting of beneficial activities as a high priority for the agency.

Other State Agencies

- Provide support to research, develop, and market recycling processes and products;
- Adopt purchasing practices that create less waste and buy environmentally preferable products; and
- Increase recycling efforts in agency operations.

Businesses

- Provide cost effective and efficient solid waste management opportunities;
- Increase efforts to recycle;
- Establish new businesses to expand recycling and composting infrastructure;

- Change purchasing practices to create less waste and buy environmentally preferable products; and
- Adopt a product stewardship ethic.

Citizens

- Change practices to create less waste;
- Purchase environmentally preferable products;
- Increase recycling efforts; and
- Compost food waste and other organics.

Summary

The efforts made over the next five to ten years will largely determine the success or failure of the State in meeting the challenges set out in this Plan. Connecticut's existing approach to solid waste management has served its citizens well. However, the solid waste field has continued to evolve to the point where new approaches and greater effort will be needed to meet the challenges. Future discussions and actions will determine the State's reliance on Resource Recovery Facilities, the potential need for new disposal facilities, the role of landfills, and how much Connecticut will pay for these programs. Most importantly, they will determine whether or not Connecticut's citizens and businesses will make a greater commitment to source reduction, recycling and composting. This Plan is only a starting point; the on-going, hard work of a diverse set of stakeholders will be needed for Connecticut to achieve its Solid Waste Management vision.

Chapter 1
INTRODUCTION

1.1 Purpose of the Plan

The mission of the Department of Environmental Protection (the "Department" or "CT DEP") is to conserve, improve and protect the natural resources and environment of the State of Connecticut. This is to be done in a way that encourages the social and economic development of Connecticut while preserving the natural environment and the life forms it supports in a delicate, interrelated and complex balance, so that the State may fulfill its responsibility as trustee of the environment for present and future generations.

As part of this responsibility, the Department has prepared this Proposed Amendment to the State Solid Waste Management Plan (the "Plan"). The Plan addresses the management of solid waste (not including non-residential hazardous waste) generated in Connecticut for the period 2005 through 2024. The Department will use this Plan as a basis for directing its solid waste programs, and other interrelated programs affecting the management of solid waste; guiding changes in state policy, legislation and programs; promoting and assisting public and private activities; and evaluating permit applications.

1.2 Statutory and Regulatory Authority for this Plan

The Department has developed this Plan in accordance with Section 22a-228 of the Connecticut General Statutes ("CGS"), which requires that the Department: establish specific goals for source reduction, bulky waste recycling, and composting; adhere to the statutory solid waste management hierarchy; assess landfill capacity needed in the State for ash residue from resources recovery facilities and for bulky waste; and outline specific strategies for source reduction. This Plan is to be adopted in accordance with the procedures prescribed in the Regulations of Connecticut State Agencies ("RCSA") Section 22a-228-1. This Plan will then super-cede the previously adopted Plan entitled: State of Connecticut, Adopted Solid Waste Management Plan, dated February 1991.

1.3 The Adoption Process

Working with both Internal and External Stakeholder Committees, supported by the services of R. W. Beck, Inc., the Department completed the development of a draft plan in late 2005. An External Stakeholders Committee was established to assist in this process and consisted of representatives from regional solid waste authorities, municipalities, non-governmental organizations, solid waste management companies, environmental and community organizations, and major waste generating industries.

An Internal Committee was established and consisted of representatives from the bureaus of Air, Waste and Water and the Office of the Commissioner (Communications, Environmental Justice and the Long Island Sound Program). The purpose of the External Stakeholders Committee was to provide their individual and collective expertise and perspectives, but the members were not asked to endorse this Plan. All meetings of the External Stakeholders Committee were open to the public, who were also afforded the opportunity to make comments. External Stakeholders Committee meeting notes and announcements of meetings; public notice of other meetings; sections of the draft Plan; and other relevant Plan information were posted and updated regularly on the CT DEP website. Appendix C summarizes the public input process in greater detail.

1.4 Solid Waste Management Plan Consistency Requirements

CGS Section 22a-229 requires that "after the adoption of a state-wide solid waste management plan pursuant to section 22a-228, any action taken by a person, municipality or regional authority that is governed by this chapter [Chapter 446d, Solid Waste Management] shall be consistent with such plan." The Department therefore reviews all solid waste permit applications for consistency with the Plan.

1.5 Solid Waste Planning Framework

1.5.1 Twenty Year Planning Horizon

This Plan addresses solid waste management in Connecticut for the period 2005 through the year 2024. Projections concerning disposal needs are provided for the 20-year planning period. These long-term projections are useful in showing the predicted trend of waste generation and management needs for the future and will be refined through future planning efforts. However, the Department will prioritize activities focused on the goals of this Plan that will be carried out over a shorter term-- the next four to five years. The ability of the State to meet the aggressive goals of this Plan will largely be determined by the success or failure of the efforts made over that period.

1.5.2 Solid Waste Management Hierarchy

The overall goal of this Plan is to safely and effectively meet the solid waste management needs of Connecticut by reducing the amount of waste generated and disposed, thereby minimizing the impacts of waste management on the environment. This goal will be attained by managing solid waste according to the following hierarchy of preferred management methods established by CGS Section 22a-228(b):

1) source reduction;
2) recycling;

3) composting of yard waste or vegetable matter;
4) bulky waste recycling;
5) resources recovery facilities ("RRF") or waste-to-energy plants; and
6) incineration and landfilling.

First, the generation of solid waste should be avoided to the greatest extent possible through source reduction. Source reduction prevents the creation of waste that would otherwise have been generated. Waste that cannot be eliminated by source reduction should be recycled, and organic materials should be recycled or composted. Finally, the remaining waste that cannot be feasibly or safely reduced, recycled, or composted, should be directed to RRFs for disposal and recovery of energy value or to other waste-to-energy plants for energy recovery. Landfill disposal should be reserved for only those wastes that are not suitable for source reduction, recycling, composting, or RRF or other waste-to-energy plants. Municipal solid waste ("MSW") incineration without energy recovery no longer exists in Connecticut.

1.5.3 Provision of In-State Capacity for Connecticut's Solid Waste

The "Determination of Need" provision in CGS Section 22a-208d requires the Department to determine that: (1) need exists in the State for additional waste processing or disposal capacity before granting a construction or expansion permit for a resources recovery facility, mixed MSW composting facility, mixed MSW disposal area, or resource recovery facility ash residue disposal area; and that (2) such facility will not result in substantial excess disposal capacity in Connecticut. It should be noted that the statute makes reference to mixed MSW composting. However, to date, the Department does not view this process as an acceptable method for managing MSW and the General Assembly amended CGS Section 22a-228(b) to eliminate composting of mixed MSW from the solid waste management hierarchy.

Since the adoption of the 1991 State Solid Waste Management Plan, much has changed. During the late 1980s through the 1990s, Connecticut implemented the strategies of the 1991 Plan and developed a strong infrastructure for recycling and disposal (RRFs and RRF ash residue landfills). There has also been change with respect to how MSW is managed in-state, regionally and on a national level. The 1991 Plan dealt solely with the solid waste needs for Connecticut and planned for Connecticut to have sufficient in-state MSW disposal capacity for Connecticut generated MSW. Until fairly recently, Connecticut facilities have been able to provide capacity for all Connecticut-generated MSW. However, there has been a trend nationally, for greater amounts of waste to flow across state borders, both into and out of states, and there has been a trend for Connecticut to export more of its MSW, construction and demolition ("C&D") waste, and oversized MSW to out-of-state disposal facilities.

Many stakeholders have argued in support of self-sufficiency for waste disposal; that is, there should be adequate disposal capacity in the State for waste generated in the State that needs disposal. It is recognized that this position represents good public

policy for Connecticut for many reasons, including the ability to better control costs and other risks related to solid waste disposal. This Plan encourages such a policy of self-sufficiency and the CT DEP will use its authority as much as possible to adhere to this approach.

While it is good public policy to manage the majority of Connecticut's waste within its own borders, we do not control all the market forces that influence the development and location of new waste management facilities. Therefore, absent a mandate to create additional State sponsored waste management infrastructure, the Department must continue to monitor the disposal capacity situation and advise decision makers of any significant changes to the overall solid waste management system that creates greater uncertainty or increased risk.

It needs to be recognized that although this Plan directs the CT DEP's primary focus for the next five years towards maximizing the amount of waste that is source reduced, recycled and composted, the State is still projected to have in-state disposal capacity shortfalls for MSW, construction and demolition waste, and oversized MSW, and, by 2019, to have exhausted the in-state disposal capacity for resource recovery facility ash residue. The State must closely monitor disposal diversion rates, disposal rates, and in-state disposal capacity as well as the status of out-of-state disposal options as part of an on-going planning cycle and be prepared to deal with disposal capacity issues.

It is recognized that small amounts of solid waste are imported into Connecticut for disposal. However, flow control rulings limit the State's control over solid waste imports and exports; therefore this Plan's discussion of solid waste disposal capacity deals solely with the disposal capacity needs for solid waste generated in Connecticut and makes no provision for capacity to handle MSW generated beyond the State's borders.

Some special wastes have unique processing and disposal requirements, not all of which can be accommodated in Connecticut (e.g., hazardous waste, biomedical waste, asbestos). Whereas the State should strive to develop infrastructure and disposal systems to handle its special waste, this Plan acknowledges that not all of the types and quantities of Connecticut-generated special waste (including C&D waste) can be processed and disposed in-state for the foreseeable future.

1.5.4 Responsibility for Solid Waste Management in Connecticut

In Connecticut, the management of solid waste is shared by the Department, the Connecticut Resources Recovery Authority ("CRRA"), municipalities, regional or municipal resources recovery authorities, regional resource recovery and recycling operating committees, and private enterprise. The Department's responsibilities, described in CGS Chapter 446d, include statewide solid waste planning, technical assistance, permitting, and enforcement. The CRRA has traditionally provided services including the development and operation of facilities such as transfer stations, recycling facilities, RRFs, and other solid waste disposal facilities (CGS Chapter

446e), and has also provided for education regarding recycling through its trash museums in Hartford and Stratford. Each municipality is required to make provisions for the safe and sanitary disposal of all solid wastes generated within its boundaries (CGS 22a-220) and to make provisions for the separation, collection, processing, and marketing of designated recyclables generated within its boundaries (CGS Section 22a-220(f)). Municipalities may create municipal or regional resource recovery authorities to plan for regional solid waste management or to develop solid waste facilities (CGS Section 7-237aa). Municipalities and regions have also developed recycling programs, and, in some cases, operate landfills and transfer stations (CGS Section 22a-220). Private entities collect waste and may own and operate recycling facilities, volume reduction facilities, transfer stations, and disposal facilities.

1.5.5 Environmental Equity

The policy of the CT DEP is that no segment of the population should, because of its racial makeup or economic circumstances, bear a disproportionate share of the risks and consequences of environmental pollution or be denied equal access to environmental benefits. The CT DEP's Environmental Equity Policy states that the Department will enhance communication with and improve environmental education opportunities for all persons, including minority and lower income communities. Further, the CT DEP will encourage community participation in the Department's ongoing operations and program development, including but not limited to inclusion on the Department's advisory boards and commissions and regulatory review panels, and encouraging participation in planning and permitting activities. The CT DEP will continue to pursue these efforts with respect to solid waste management and strive to educate all populations about source reduction, recycling, composting, and appropriate handling and disposal of all solid waste and household hazardous wastes.

1.6 Variables Potentially Impacting Solid Waste Management

There are many factors that will likely affect Connecticut's solid waste management system over time, including the following. Although the Department has little statutory control over these factors, they could impact the strategies proposed in this Plan. It is therefore very important that the Plan be reviewed and updated regularly.

- Expiration of the RRF contracts and retirement of the bonds that financed them, with the potential transfer of control of most RRFs processing capacity from the public to the private sector is expected to occur over the next ten years. Capacity at the Mid-CT RRF would remain under CRRA control. At the same time, the favorable electric rate contracts will expire and the RRFs will be paid at market rates for the electricity they generate. A more detailed discussion of this issue is found in Chapter 5 and Appendix K.
- Mergers and acquisitions in the private waste management industry can change the economics of Connecticut's solid waste management system by impacting collection and tipping fees. Such consolidation may also encourage out-of-state

disposal if there are economies of scale associated with hauling out of state and tipping fees are lower in other states.

- New technologies will likely expand the management options for solid waste. Such technologies could provide alternatives to disposal of certain categories of waste and might include less polluting waste to energy facilities, the conversion of clean wood wastes into fuel through gasification, or the beneficial use of wastes in products. The Department will support new technologies that use and manage wastes in a manner that is less harmful to human health and the environment than existing technologies.
- The EPA's report, Characterization of Municipal Solid Waste in the US: 1998 Update, and other studies indicate that there is a statistically significant positive relationship between economic activity and waste generation. Consequently, waste generation projections for the state will likely need to be adjusted as the economy grows or contracts.
- Broad cultural changes are also likely to impact waste generation and management. For example, there has been an increase in the amount of computers and other electronic equipment in the waste stream as computer technologies have advanced. The increased use of computers and e-mail in home setting may increase the amount of high-grade office paper in the residential waste stream and a projected increase in on-line shopping would result in higher quantities of corrugated and packaging materials in the waste stream. The Department will monitor waste characterization and composition studies and analyze the impact of these changes on solid waste management needs in Connecticut.

1.7 Plan Contents

After this Introduction, the Plan includes the following:

Chapter Two summarizes Connecticut's current conditions and practices and identifies key issues that will determine the State's future directions, highlighting the State's need to simultaneously address the following:

1. The need to substantially increase source reduction, reuse, recycling and composting to: reduce the overall environmental impacts associated with waste and realize the environmental benefits of reducing waste generation such as conservation of natural resources, reduced emissions of pollutants, reduced green house gas emissions, and reduce the need for waste disposal capacity;
2. The need to address how Connecticut will respond to a shortfall in in-state disposal capacity for MSW, C&D waste and other bulky wastes.
3. The need to ensure that the State's solid waste management structure will grow and adapt to changing conditions over time.

Chapter Three presents Connecticut's long range vision to treat solid waste as a valuable resource, including principles and goals that will be used as a guide to the State's efforts in managing solid waste.

Chapter Four presents an outline for action, including specific objectives and strategies for eight critical areas:

1. Source Reduction;
2. Recycling and Composting;
3. Management of Solid Waste Requiring Disposal;
4. Management of Special Wastes and Other Types of Solid Waste;
5. Education and Outreach;
6. Program Planning, Evaluation, and Measurement;
7. Permitting and Enforcement; and
8. Funding.

Chapter Five outlines implementation approaches to the Plan and begins with a discussion on roles and responsibilities by both the public and private sectors and ending with a comprehensive listing of the proposed strategies and assigned type of action needed, priority, costs, time frames, and leading responsible entity (i.e., government, private sector, others).

The Appendices to this Plan were prepared to provide detailed backup information that was considered during the preparation of the Plan. These appendices include the following:

- A. Definitions and Acronyms;
- B. Data Summary, Validation, and Assessment;
- C. Stakeholder and Public Input Process;
- D. Current MSW Waste Diversion Practices;
- E. Options to Increase Waste Diversion;
- F. Solid Waste Disposal Overview;
- G. Cost Analyses of Out-of-State Disposal Options;
- H. Special Waste Management;
- I. Environmental Impact of Disposal Options
- J. Projections of Solid Waste Generation and Disposal.
- K. MSW RRF - Status of Ownership.

Additional Information related to the development of the Plan, public input process and general solid waste management information is available on the CT DEP's Internet web site at http://www.dep.state.ct.us/wst/.

Chapter 2
CURRENT CONDITIONS AND PRACTICES: CONNECTICUT AT A CROSS ROADS

2.1 Overview

Connecticut enjoys a comprehensive and highly effective integrated solid waste management system, including widespread municipal solid waste recycling services, regional resources recycling facilities and, for bulky wastes, a system of volume reduction facilities and bulky waste landfills. This system effectively met the State's needs through much of the 1990s. However, the system has not grown to keep pace with increasing waste generation, and Connecticut is now exporting growing quantities of solid waste to other states for disposal. To stem this trend, the State must substantially reinvigorate source reduction, recycling and composting while simultaneously identifying acceptable disposal capacity, especially for bulky wastes. Environmental effects, economics, and principles of environmental justice must be taken into account when assessing various solid waste management options. Successfully increasing recycling and source reduction will yield many benefits including job creation, conservation of natural resources, reduced energy use, reduced greenhouse gas emissions, reduced air and water pollution, reduced water use, and conservation of disposal capacity. It will also require significant new investment, legislation and policy changes affecting all consumers, businesses and lead government agencies with a stake in waste management. How decision makers choose to respond will determine the future of materials management in Connecticut for many years to come.

The sections below describe Connecticut's solid waste management challenges in greater detail, providing a broad overview of solid waste generation and management practices, Connecticut's integrated solid waste management infrastructure, key factors affecting solid waste management in Connecticut, and the key issues this Plan addresses that will guide the next era of solid waste management in Connecticut

The basis of the Plan is a series of solid waste projections by R. W. Beck based on historic solid waste data (FY1992 through FY2004) reported to and compiled by the CT DEP, including FY2003-MSW generation and Recycling and FY2004-MSW disposal and bulky waste recycling and disposal. Additional detailed information on current practices is provided in the appendices.

2.2 Solid Waste Generation and Management Practices in Connecticut

2.2.1 Types of Solid Waste

The legal definitions, taken from both the Connecticut General Statutes ("CGS") and the Regulations of Connecticut State Agencies ("RCSA"), of the major categories of solid waste are listed below. This Plan focuses largely on the management of two types of solid wastes: municipal solid waste and bulky wastes. Several other categories of "special" solid wastes are also addressed, but in less detail.

Types of Solid Waste

Solid waste means unwanted or discarded solid, liquid, semisolid or contained gaseous material including, but not limited to, demolition debris, material burned or otherwise processed at a resources recovery facility or incinerator, material processed at a recycling facility and sludges or other residue from a water pollution abatement facility, water supply treatment plant or air pollution control facility. (CGS Section 22a-207(3))

Municipal solid waste means solid waste from residential, commercial and industrial sources, excluding solid waste consisting of significant quantities of hazardous wastes as defined in section 22a-115, land clearing debris, biomedical waste, sewage sludge and scrap metal. (CGS Section 22a-207(23))

Special waste means the following wastes, so long as they are not hazardous waste pursuant to CGS Section 22a-115 or radioactive material subject to CGS Section 22a-148: 1) water treatment, sewage treatment or industrial sludges, liquid, solids and contained gases, fly ash and casting sands or slag, contaminated dredge spoils; 2) scrap tires; 3) bulky waste as defined in this section; 4) asbestos; 5) residue; and 6) biomedical waste (RCSA Section 22a-209-1).

Bulky waste means land clearing debris and waste resulting directly from demolition activities other than clean fill. (RCSA Section 22a-209-1)

2.2.2 The Integrated Solid Waste Management Hierarchy

Like most states, Connecticut has formally adopted the integrated waste management hierarchy as a guiding framework for solid waste management efforts. Perhaps more than any other state, Connecticut's system adheres to this hierarchy by emphasizing source reduction, recycling, composting, and energy recovery from solid waste, while relying on landfill as a last resort. Table 2-1 summarizes the hierarchy as stated in Connecticut statute, and summarizes how it is applied in Connecticut, and the current status of each management approach.

Table 2-1
Connecticut's Application of the Integrated Waste Management Hierarchy

The Integrated Waste Management Hierarchy	Examples of Application in Connecticut	Status
Source Reduction	Some reuse programs in municipalities; State toxicity reduction laws (toxics in packaging, mercury reduction). Limited activity related to Construction and Demolition debris(C&D) or bulky waste source reduction.	Undetermined toxicity reduction from waste stream. Difficult to measure and promote.
Recycling not including composting	Municipal and hauler-provided recycling services for mandated recyclables (plus some additional materials). Nine recycling regions (some no longer active); numerous recycling processing facilities – some associated with recycling regions. Deposit system for carbonated beverage containers and lead acid storage batteries.	About 823,000 tons recycled in 2003, of which 624,000 was paper. Amount includes estimates for material not captured in CT's recycling reporting system; does not include yard waste composted (see below). Recycling rate nearly stable since 1997.
Composting of Yard Waste or Vegetable Matter	100 yard waste composting facilities statewide, including 80 municipal, 14 private (non-farm) and 6 private (on-farm) facilities. Municipal/regional promotion of on-site organics management.	About 233,000 tons of yard waste composted in 2003, plus small quantities of food waste. About 49,000 tons organics estimated to have been home composted and/or grasscycled in 2003. Growth is flat.
C&D/Bulky Waste Recycling (not including most land clearing or other clean wood). Clean fill is not regulated as a solid waste in CT	20 C&D volume-reduction facilities (19 private and 1 publicly owned) process and recycle small percentages for recycling.	Few statistics available, an estimated seven percent recycled in 2003 (67,000 tons – mostly scrap metal and some clean wood). Amount recycled probably stable. This does not include the clean fill component of C&D waste – most of which is probably reused. EPA estimates that clean fill represents 40-50% of building related C&D waste.

Table 2-1
Connecticut's Application of the Integrated Waste Management Hierarchy

The Integrated Waste Management Hierarchy	Examples of Application in Connecticut	Status
Resources Recovery Facilities (RRF) or Waste-to-Energy Plants	6 Municipal Solid Waste (MSW) facilities with a total maximum permitted design capacity of about 2.6 million tons per year (TPY) MSW.	RRF capacity stable with most facilities expected to operate for another 20 years. One facility may close within next five years with loss of about 153,000 TPY of capacity. Three others have the potential of reverting from public to private ownership.
Incineration and Landfilling	Only 2 active MSW landfills remain with very limited capacity, one closing in 2006, the other in 2007. (The MSW taken by one of those landfills is mostly RRF non-processibles and processing fines). 24 active bulky waste landfills (all but 1 municipally owned).	About 121,000 TPY CT MSW landfilled in CT in FY2003; about 153,000 TPY in FY2004. Of the total 134,000 TPY of bulky waste disposed in CT, about 125,000 TPY was landfilled in CT and about 8,800 TPY was incinerated in RRFs CT in FY2004. About 909,000 TPY bulky waste is exported for landfill in other states.

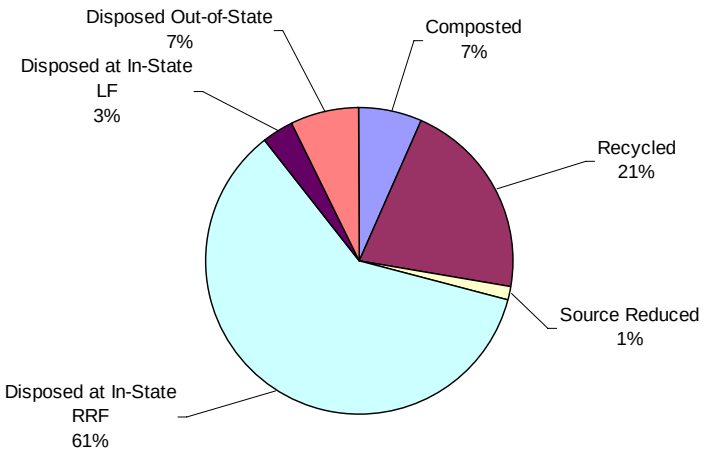
2.2.3 Management of Municipal Solid Waste

As summarized in Figure 2-1, in 2003 approximately 3.7 million tons of MSW were generated, and the estimated statewide MSW diversion rate was about 30 percent (1.1 million tons), having held essentially steady since 1997. In 2003 approximately 64 percent of the total generated MSW was disposed in state (2.3 million tons). The vast majority of this disposed MSW, about 2.2 million tons, was managed in the state's six resources recovery facilities, generating electricity as a by-product. (As discussed below, about 0.6 million tons of residual ash resulting from RRF processing was also disposed at landfills (LF) in Connecticut and New York.) In part because of a shortfall in in-state disposal capacity, the remaining seven percent of generated MSW (269,000 tons) were reported exported for disposal in other states. However, there was approximately 70,000 tons of MSW from out-of-state disposed at Connecticut RRFs and LFs. Statistics on MSW management are in some cases approximate, and all of these estimates are based on the best available data. MSW source reduction, recycling, composting and disposal are summarized in Chapter Four along with proposed strategies, and are also analyzed in depth in the appendices.

According to CT DEP data, per capita MSW disposal rates have increased from 0.71 tons/person/year in 1992 to 0.75 tons/person/year in 2003 (See Figure 2-2). R.W. Beck estimates for Connecticut MSW disposed in 2005 indicated a per capita MSW

disposal rate of 0.76 tons/person/year (using April 2005 U.S. census population projections for Connecticut). While data problems preclude an accurate analysis, this trend is confirmed by experience in Massachusetts and Maine, which have reported three and nine percent increases in generation from 2001 to 2002, respectively.

Figure 2-1
Municipal Solid Waste Management in 2003 Based on Reports Submitted to CT DEP and Estimates of Additional Recycling Not Captured in those Reports
(Total Generation = 3.7 million tons per year)



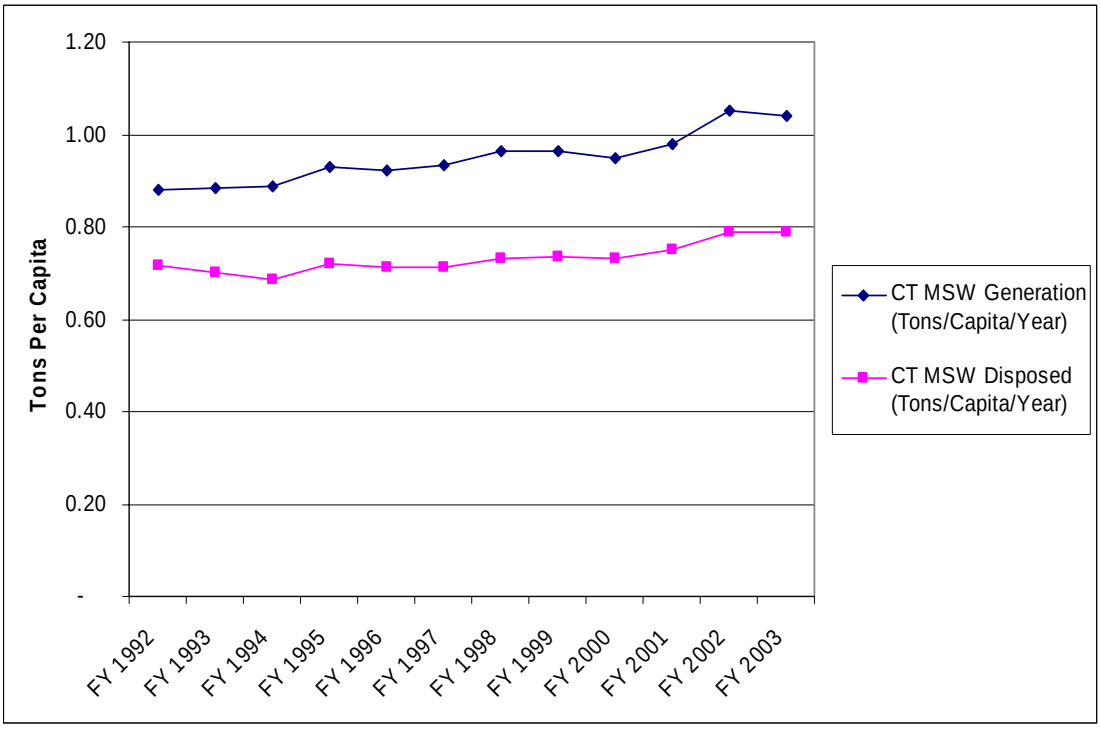
Source: CT DEP and Estimates by R.W. Beck

MSW Source Reduction

Source reduction, while at the top of the State's hierarchy, is the most challenging management strategy. Several municipalities encourage on-site management of organics wastes (e.g., home composting and grass cycling), and the CT DEP estimates indicate that in 2003 these efforts reduced the amount of MSW that needed to be managed off-site by about 49,000 tons; however, the waste was still generated. A ban on the disposal of leaves and grass clippings further encourages source reduction of these materials. Other source reduction efforts are limited. A limited number of Connecticut municipalities have pay-by-the-bag (pay-as-you-throw or PAYT) pricing for garbage services that provides an incentive for source reduction. As more municipalities adopt automated trash pick-up, the number of municipalities with PAYT pricing may increase as well, since service charges for larger containers are usually higher than for smaller containers. However it is unknown whether the price differentials offered for automated trash pick-up are high enough and/or flexible enough to provide residents with an incentive to reduce waste disposal. Some businesses and consumers practice source reduction activities such as utilizing waste

exchanges, swaps, and consignment shops; repairing rather than disposing; double sided copying; using cloth bags; reusing products; using reusable transport packaging; and others. The extent to which these activities are practiced is not known. However, they are not believed to be widespread. Nationally, manufacturers have taken steps to reduce the weight of their packaging and products, but these are not counted as part of state figures.

Figure 2-2
MSW Per-Capita Disposed
FY 1997 – FY 2003



Source: CT DEP

In addition to reducing waste quantity, source reduction also seeks to reduce the toxicity of the waste stream through redesign of products and packaging and changes in purchasing and other practices. In 1990, the General Assembly adopted the Toxics in Packaging Act, subsequently codified as CGS Section 22a-255g-m. This Statute prohibits the intentional use of four specific heavy metals (cadmium, hexavalent chromium, lead and mercury) in packaging, including packaged products, sold or offered for promotional purposes in Connecticut. The State is a member of the Toxics in Packaging Clearing House (originally housed in CONEG- Coalition of Northeastern Governors and now housed in NERC – the Northeast Recycling Council) which supports and coordinates the implementation of the Model Toxics in Packaging Legislation that has been adopted in 19 states. In 1992, Connecticut became one of

the first states to pass a law restricting the level of mercury in alkaline batteries. In 2002, Connecticut adopted comprehensive mercury reduction legislation that was codified as CGS Sections 22a-612 through 22a-625. The legislation establishes a program to eliminate non-essential uses of mercury in consumer, household and commercial products. The law covers a broad range of topics such as manufacturer's notification, specific product bans, sale restrictions, mercury-containing lamp management, labeling requirements, manufacturer's collection plans, and mercury products handling and disposal requirements. The first provisions of the law were effective July 1, 2002 with full implementation of all requirements by July 1, 2013.

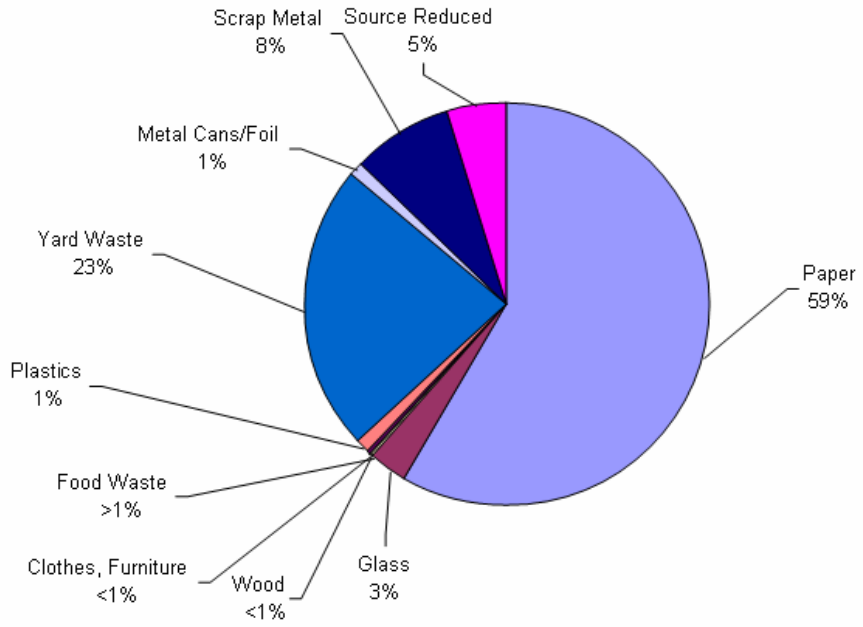
MSW Recycling and Composting

As presented in Figure 2-3, about 1.1 million tons were estimated recycled and composted (including material home composted and grasscycled) in 2003, with paper representing about 59 percent of the material recycled or composted. Connecticut's recycling system is driven by a State mandate that the following materials be recycled:

- Glass and metal food containers;
- Scrap metal;
- High grade white office paper (only required for the non residential sectors);
- Old newspapers;
- Waste oil;
- Leaves;
- Lead acid storage and Ni-Cd rechargeable batteries; and
- Grass
- Corrugated Cardboard.

Figure 2-3
Connecticut Estimated MSW Recycling Rates in 2003

(Total MSW Recycled Estimated at 1.1 million tons – includes estimates for non-reported MSW recyclables)



Source: CT DEP and Estimates by R.W. Beck

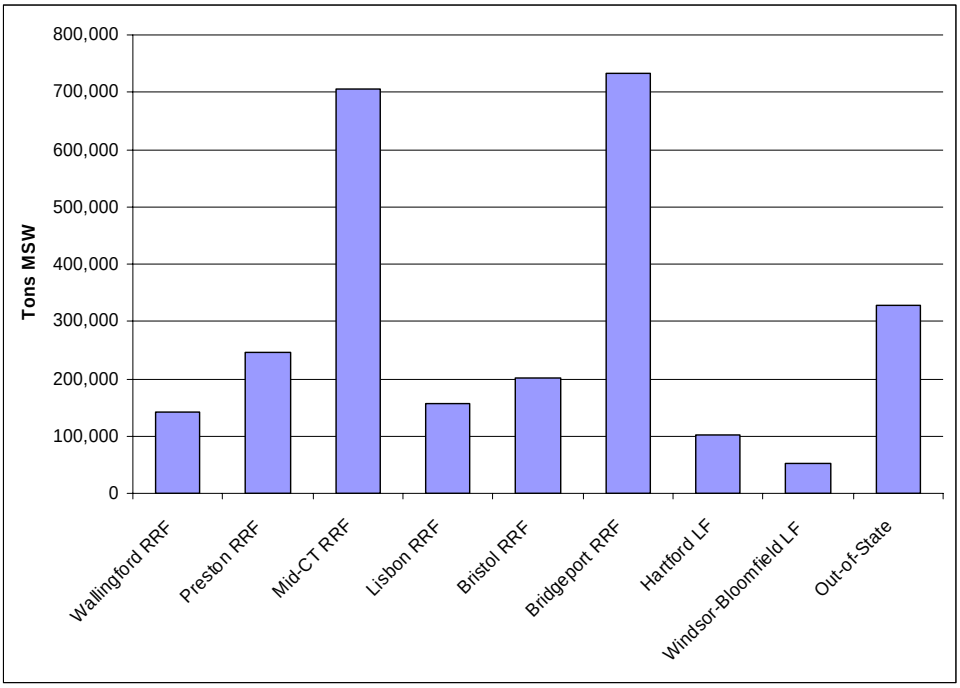
All generators are required to recycle these items (except high grade white office paper which is required to be recycled only by non-residential sectors). Many municipalities collect additional materials such as magazines, residential mixed paper and plastic containers. The infrastructure for aggregating and collecting the mandated recyclables vary from town to town and can include collection by municipalities, by private haulers, or a combination of the two and municipal drop-off options (i.e. self haul). The collected materials are either sent directly to end markets or are processed at Connecticut recycling processing facilities or composting facilities (both municipal and privately owned) which market the materials (municipal composting sites often give away the compost to residents) after preparing them to market specifications or send them to other recycling facilities for further processing. After rapid growth in the early to mid 1990s, Connecticut's recycling system, like many other states, is now stagnant and in need of reinvigoration. Advantages of Connecticut's recycling system include the fact that almost all communities: (1) have access to some level of recycling services and (2) either belonged, or had the potential to join or form, regional organizations to assist with marketing and processing of recyclables (though regional support has waned in recent years). Reasons for the stalled growth include a lack of funding for municipal programs, insufficient incentives for commercial recycling, reduced awareness and interest by consumers and businesses and a lack of funding and

staff support at the municipal, regional and state levels that has stalled efforts to promote and expand programs, and enforce existing requirements.

MSW Resource Recovery

The State's primary MSW disposal management approach is energy recovery through six MSW resources recovery facilities statewide, with a combined maximum permitted design capacity of approximately 2.6 million tons per year, providing disposal for approximately 140 out of 169 municipalities in the State. In 2003, approximately 60 percent (2.2 million tons) of all MSW generated in Connecticut was burned in these facilities (See Figure 2-4). This is the highest percentage of resources recovery disposal capacity of any state in the nation. Five of the six facilities have at least 20 years of remaining useful life assuming normal maintenance and ongoing upgrading of environmental control technologies. However, the Wallingford project, is currently operating with an energy contract with a very favorable energy price. This contract will terminate in 2009, with the likely result that Wallingford's post-contract energy revenues would be significantly lower than they currently are. It is possible that under that scenario the Wallingford facility may not be economically viable to operate and might cease operating as early as 2009. The capacity it currently provides (about 143,000 tons per year burned) would therefore no longer be available. Further, within the next ten-year timeframe, ownership and control of four of the MSW RRFs may transfer from the public to the private sector, including the Bridgeport RRF (2008); Wallingford RRF (2010); Bristol RRF (2014); and Southeast/Preston RRF (2015). A more detailed discussion of this issue is found in Sections 5.2 and 5.3 and Appendix K of this Plan.

Figure 2-4
MSW Disposed in Connecticut
FY 2004



Source: CT DEP

MSW Landfilling

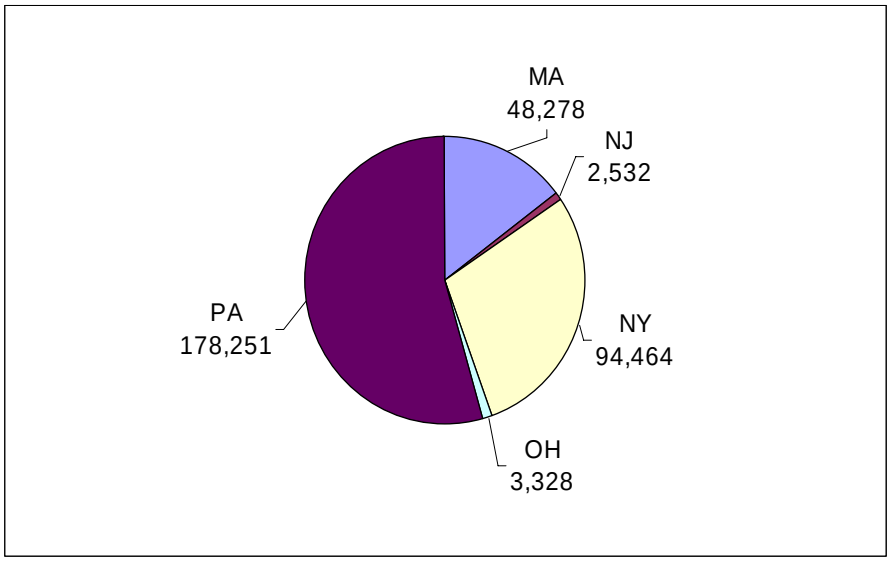
Only about three percent (121,000 tons) of the total amount of Connecticut generated MSW was landfilled in-state in 2003. There are only two landfills permitted to accept MSW. One is controlled by CRRA and the other is owned by a municipality. CRRA controls the Hartford Landfill under a long-term lease with the City of Hartford and uses it primarily for refuse derived fuel (RDF) process residue, as well as by-pass and other MSW not able to be processed in RRFs. Approximately 101,000 tons of MSW (83,579 tons not including the oversized MSW) was disposed at the Hartford Landfill in 2003. The Hartford landfill is expected to cease accepting MSW in 2006.

The only other landfill permitted by the CT DEP to accept MSW is the Windsor-Bloomfield Sanitary Landfill owned by the Town of Windsor. The Department estimates that the Windsor-Bloomfield landfill had approximately 400,000 cubic yards of capacity remaining as of mid-2005, and it is scheduled to close at the end of 2007. Approximately 27,000 tons of MSW was disposed at the Windsor-Bloomfield Landfill in 2003 (in FY2004 they buried twice as much i.e. 51,000 tons of CT MSW).

MSW Imports and Exports

With minimal MSW landfill capacity, and essentially fixed RRF capacity, out-of-state disposal facilities serve as the only option for MSW requiring disposal beyond the existing in-state MSW disposal capacity of approximately 2.34 million tons per year. However a significant change in ownership of disposal capacity at the CT RRFs, within the next ten years, from public to private sector control may alter this waste flow balance. Thus, while down slightly (based on reported exports) from a peak in 2002, out-of-state disposal of MSW has increased tenfold from approximately 27,000 TPY in 1994 to approximately 327,000 TPY in 2004. Individual out-of-state disposal facilities and annual MSW tonnage received from Connecticut in 2004 are summarized in Figure 2-5. Some states also send waste into Connecticut, however the quantity has decreased over time. In 2004, Connecticut imported about 52, 000 tons of waste (most from Massachusetts, with small amounts from Rhode Island, New York, and New Jersey). The State was a net exporter of MSW, with approximately 275,250 net tons exported in 2004.

Figure 2-5
MSW Exported for Disposal in 2004



Source: CT DEP

2.2.4 RRF Ash Residue

The six MSW RRFs in the State generated an average of approximately 551,000 TPY of ash residue (not including metal separated from the ash and recycled) over the five year period FY2000-FY2004. Two landfills in the State are permitted to accept and dispose of ash residue. The ash monofill section of the Hartford Landfill currently only accepts ash residue from the Mid-Connecticut RRF (about 174,000 in FY2004) and is estimated to reach capacity and close in October 2008. The Putnam Ash

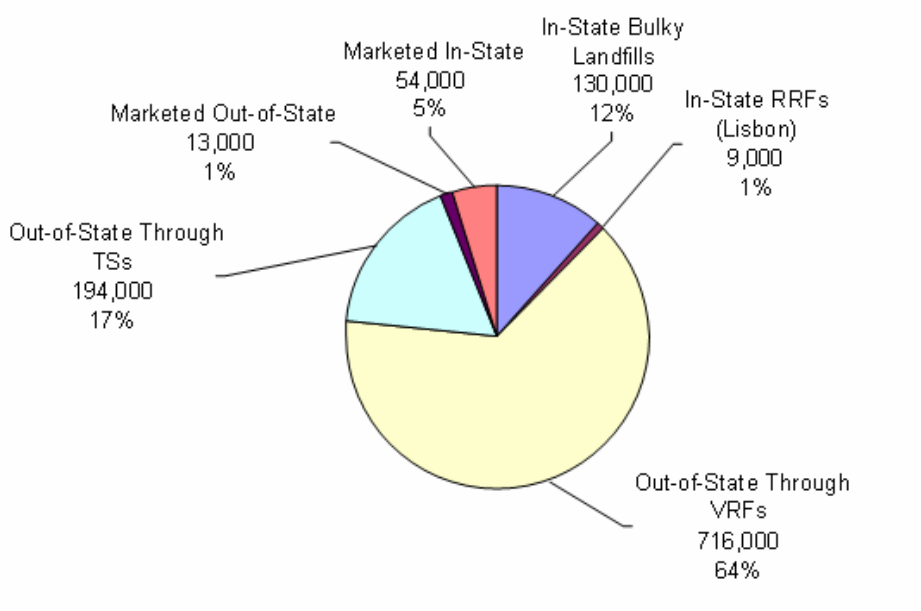
Landfill accepted about 343,000 tons of ash from four Connecticut RRFs in FY2004 and, as of the end of 2004, had remaining capacity to accommodate approximately 6.7 million tons of ash residue; enough to dispose of ash from all six RRFs through FY2018 and part of FY2019 (assuming the Wallingford RRF closes in FY2010 and the Bristol RRF sends its ash residue to the Putnam Ash Landfill after FY2009 when the contract with Seneca Meadows expires). Currently RRF ash residue (not including post-combustion metal recovered from the ash) from the Bristol RRF (48,000 tons in FY2004) is disposed at the Seneca Meadows Landfill in Waterloo, NY.

2.2.5 Bulky Waste Management

Connecticut statutes define demolition waste (other than clean fill) as "bulky waste," along with land clearing debris. However, in practice, oversized MSW wastes (e.g., mattresses and furniture) are commonly handled along with construction and demolition wastes, and consequently in this Plan are termed "C&D waste/Oversized MSW".

As shown in Figure 2-6, about 1.1 million tons of Connecticut C&D waste/oversized MSW were reported processed and transferred through or disposed at Connecticut solid waste facilities in FY2004. About 820,000 tons were reported disposed or marketed after being processed by 16 of the State's C&D volume reduction facilities ("VRFs"), and about 193,000 tons of "bulky waste" (actually C&D waste/oversized MSW) were reported transferred to out-of-state disposal facilities through four Connecticut multi-town regional transfer stations. Connecticut bulky waste landfills received waste directly from generators, from Connecticut multi-town regional transfer stations, and from Volume Reduction Facilities. Single or two town municipal transfer stations also received and transferred C&D/Oversized MSW; nine of those municipal transfer stations reported sending that waste to out-of-state disposal facilities. The vast majority of bulky waste taken to transfer stations is sent to landfills, although a small amount goes to VRFs for further processing and recycling. Most of the C&D waste/Oversized MSW generated in FY 2004 was disposed out-of-state.

Figure 2-6
Final Disposition of CT C&D/Oversized MSW
FY 2004 (Total Generation = 1.1 million tons)



Source: Solid Waste Facility Reports submitted to CT DEP

Bulky Waste Diversion

Recycling of C&D waste /Oversized MSW is estimated to be only about seven percent (67,000 tons). However, this does not include most of the clean fill which is part of this waste stream and which is generally reused or recycled. As of August 2005, there were approximately 20 permitted C&D volume reduction facilities ("VRFs") in Connecticut. All but one of these facilities are privately owned. They have a combined permitted capacity of approximately 11,000 tons per day, or 2.7 million TPY. VRFs sort construction and demolition waste, process it for recycling (Connecticut VRFs recover very little for recycling), and reduce the volume of waste (most of the waste received by Connecticut VRFs is volume reduced i.e. ground) to enable more cost-effective transport to landfills, primarily out-of-state. Materials recovered for reuse and recycling may include: brick and block, clean fill, ferrous metal, corrugated cardboard (very little if any recycled from the C&D waste), and clean untreated wood. VRFs also produce chipped demolition wood that may be suitable for combustion (hog fuel). Some residue from VRF processing may contain a concentration of highly contaminated materials and thus should be disposed at lined landfills (paint containers, mixed metal packaging, small fragments of paint chips, soil, wood, plastics, insulation, and wallboard).

Bulky wastes, especially the construction and demolition portion, may contain significant quantities of materials that contribute to the overall toxicity. These

materials include wood which may have been pressure treated, coated with lead based paint, adhesives, pesticides or other substances defined as hazardous under CGS Section 22a-115(1), gypsum wallboard, asbestos, and asphalt shingles. In addition, demolition activities may result in the inclusion of old appliances containing CFCs, fluorescent light fixtures, old electronics appliances, lead acid batteries, and roofing materials in waste to be disposed. The most effective way to reduce toxicity to an appreciable extent is through separation of potentially toxic materials at the source. For demolition projects the Department encourages an assessment of whether there are materials that contain lead or other hazardous components in the structure to be demolished and disposed. To that end, in 1994 the Department published the document, Guidance for the Management and Disposal of Lead-Contaminated Materials Generated in the Lead Abatement, Renovation, and Demolition Industries.

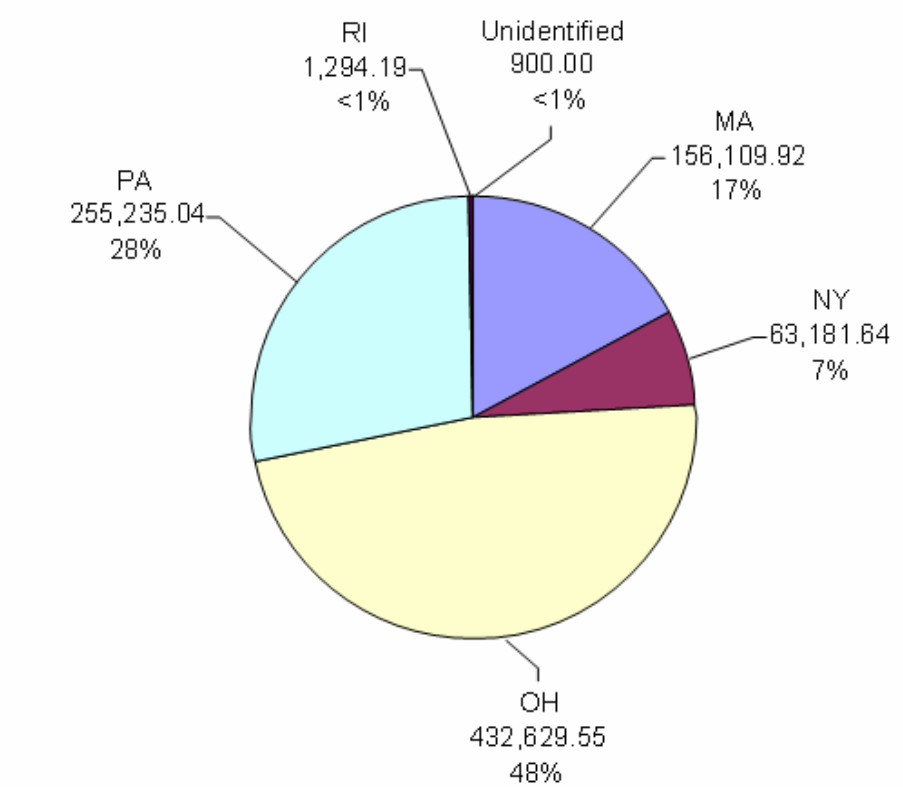
Bulky Waste Disposal

Bulky waste is generally not accepted at Connecticut's RRF facilities, but untreated wood chips recovered from C&D waste received at a C&D VRF located in Waterford, Connecticut were reported sent to the Lisbon RRF and burned in FY2004 and FY2005 (8,800 tons in FY2004; 10,300 tons in FY2005). In addition, the MidCT RRF reported receiving and burning a small amount of wood chips, the source of this material was not reported (836 tons in FY2004; 5,295 tons in FY2005). In FY2004 about 93 percent of Connecticut C&D waste/Oversized MSW was disposed in landfills (and one RRF). Of this amount, only about 12 percent was disposed in Connecticut and about 81 percent was transported out-of-state to landfills in Massachusetts, Ohio, New York, Pennsylvania and Rhode Island. There are 24 active landfills in-state that accept bulky waste and/or C&D waste/oversized MSW; these landfills are not lined. Only one of these is privately owned and operated. Most of the remaining landfills are municipally owned, small, serve only their communities, and are expected to close soon (with the exception of the Glastonbury landfill). The only regional landfills currently burying C&D waste/oversized MSW are the Hartford, Manchester, and Windsor-Bloomfield landfills.

Import and Export of Bulky Wastes

Transfer stations and VRFs reported sending approximately 909,000 tons of Connecticut bulky waste to 35 out-of-state landfills in five states in 2004. As shown in Figure 2-7, bulky waste was transported to Ohio (48 percent of the total), Pennsylvania (28 percent), Massachusetts (17 percent), New York (7 percent), and Rhode Island (< 1 percent). There was very limited amount of bulky waste imported into the State and disposed at Connecticut disposal facilities (only about 400 tons in FY2004). However, there were about 7,000 tons of out-of-state bulky waste reported received at Connecticut transfer stations and subsequently transferred to out-of-state disposal facilities.

Figure 2-7
Summary of CT-Generated Bulky Waste Reported Disposed Out-of-State
FY 2004 by CT Transfer Stations and CT C&D VRFs



Source: CT DEP

2.2.6 Management of Other Types of "Special Wastes"

While this Plan focuses largely on MSW and bulky wastes, there are several other types of "special wastes" addressed, as discussed below.

Household Hazardous Wastes (HHW)

HHW includes oil-based paints, thinners, pool chemicals, pesticides, mercury thermometers, and gasoline that are generated by residences or small businesses in small quantities, and often collected and managed along with MSW. Statistics on the volume of HHW removed from the MSW stream are not available; however, there are five permanent HHW collection facilities and, in addition, in 2005 there were 72 collection events scheduled throughout Connecticut. Additionally, CT DEP has held in the past special events to collect mercury-containing devices or elemental mercury. Such programs have targeted schools, dental offices, medical facilities (e.g., thermometer exchanges) and households (e.g., thermometer exchanges and thermostats).

Dredge Materials-Long Island Sound

Dredged materials refer to material removed from both inland and marine waters. The main challenge with inland dredged materials is associated with the removal of dams on rivers and management of sediment from behind the dam, which is often contaminated. This material must be managed in a similar way to contaminated soils. The potential volume of marine dredged materials is much more significant. Dredge materials result from dredging operations to deepen harbors and navigation channels and anchorages. In June 2005, EPA issued a final rule that concerns ocean disposal and the designation of dredged material disposal at sites known as Central and Western Long Island Sound. This final rule requires that a regional dredged material management plan ("DMMP") for Long Island Sound must be prepared by June 2013 by the Army Corps of Engineers, in consultation with the states of New York and Connecticut and EPA which includes a comprehensive study of disposal alternative. One of the goals of the DMMP process is to evaluate alternatives to open water disposal. Before the disposal of dredged material may be authorized at either of the two sites subject to the rule it must be determined that there are no practicable, environmentally preferable management options available. The types of alternatives that are generally considered include upland disposal (e.g., landfill), beneficial use (e.g., beach nourishment), or sediment treatment technologies that might render the material suitable for other types of uses. This Final Rule applies to all federal projects and/or projects greater than 25,000 cubic yards. According to the CT DEP, approximately 1.125 million tons of dredge material is generated in Connecticut each year from dredging operations in Long Island Sound. Currently there is not a treatment facility in Connecticut designed to treat dredged materials with the goal of reusing the material; there is research ongoing.

Street Sweepings

In 2005, the Department produced a guidance document on the management, reuse and disposal of street sweepings and catch basin clean-outs. Street sweepings disposal options include disposal in a MSW solid waste disposal facility, typically a landfill. However, since current landfill space is quite limited, this is not a realistic option. Since street sweepings are often collected well after the threat of freezing temperatures, their physical properties are typically altered enough that they are no longer useful for road applications. Currently, the most prevalent scenario is that the street sweepings are stockpiled creating a management problem for the municipalities. Statistics on the quantity of street sweepings generated and how they are managed are not available.

Catch Basing Cleanings

Catch basin cleanings are usually wetter and have a higher organic content than street sweepings. Catch basin cleanings generally have higher levels of pollutants than street sweepings, as well. Catch basin cleanings are also more likely to have been affected by spills and polluted runoff than street sweepings. A vactor truck is commonly used to clean catch basins and wastewater discharged from a vactor truck may be decanted

into a sanitary sewer or a regional wastewater treatment plant. The solids may be dried and disposed in a sanitary landfill or used as landfill cover. As in the case of street sweepings, there is very limited in-state opportunity for their use as landfill cover. They are often stockpiled, sometimes with street sweepings, adding to the management difficulties with street sweepings. Statistics on catch basin cleanings are not available.

Sewage Sludge

Sewage sludge is generated by the 111 wastewater treatment plants located in Connecticut. The wastewater treatment plants process more than 547 million gallons of wastewater each day; most sewage sludge is de-watered on-site resulting in a generation of approximately 118,000 dry tons de-watered cake per year (processed). Sewage sludge is handled by incineration, on-site/composted, or is shipped out-of-state for disposal. Approximately, 74 percent of all facilities in the State send their sludge to one of the State's six sewage sludge incineration facilities. The amount of ash residue that is generated as a result of the incineration is only reported to the CT DEP if the disposal occurs within the State. Approximately ten percent of the sludge is managed on-site/composted. Less than 14 percent of the sludge is shipped directly to out-of-state facilities. Less than two percent of the sludge is managed in some other manner. State regulations do not allow for beneficial reuse of this type of ash residue.

Contaminated Soils

Contaminated soils are typically generated as a result of fuel and chemical spills, leaking oil tanks, and industrial accidents. Contaminants may include any substance that has the potential to pollute air or water. Owners of property containing contaminated soils generally retain a private contractor to clean up the site. Soil contamination varies in degree and is typically handled through one or more of the following options available to responsible parties in Connecticut for managing contaminated soils: deliver it to an out-of-state facility; dispose of it at an in-state landfill; deliver it to an in-state treatment facility; and reuse it in accordance with the State's Remediation Standard Regulations.

- Responsible parties may take contaminated soils to landfills or soils reclamation facilities in neighboring states. Remediation projects in areas close to bordering states often take advantage of this option. Anecdotal evidence suggests that a significant fraction of Connecticut's contaminated soils are handled in this way. However, soils moving out of state are not tracked.
- Three landfills in Connecticut accept contaminated soils, but only with a "Special Waste Disposal Authorization" ("SWDA") from the CT DEP. Although the individual authorizations stipulate the amount that can be disposed, the DEP does not aggregate these amounts for reporting purposes. Tipping fees at Connecticut landfills with a SWDA may range from $60.00 to $80.00 per ton.
- A soil remediation facility is located in Waterbury, CT and charges a tipping fee of approximately $50.00 per ton to treat petroleum-contaminated soil.

- Reusing of polluted soil on another site requires testing of the soils and approval of the Commissioner of the CT DEP. The reuse must follow the soil reuse requirements of the State's Remediation Standards Regulations.

Animal Mortalities

Animal Mortalities are typically managed by CT DOT or municipal road crews. These types of animal mortalities are generally managed by dragging the animal off the road and burying it. Usually road crews are instructed not to bury dead animals too close to a road, nor to bury it near a wetland. Mass burial of dead animals on DOT or municipal property is not recommended. In some states, animal mortalities are routinely composted with other organics. This does not appear to be a common practice in Connecticut. Proper management of animal mortalities in residential areas can be challenging. Large-scale animal mortalities from illness are often managed through RRFs. The animals are euthanized and disposed as special wastes for a higher tipping fee at a resources recovery facility.

Land Clearing Debris

Currently in Connecticut, land clearing debris is managed as follows: (1) chipped or ground and then used for mulch or as a component in compost by municipalities and private recycling facilities; (2) milled for lumber or processed into firewood (but most land clearing debris is unsuitable for either product); (3) left on site to decay; (4) illegally buried on site (stumps and woodchips); (5) burned legally on-site pursuant to CGS Section 22a-174(f) or RCSA 22a-174-17; (6) dumped illegally on remote sites; (7) historically, some was chipped and sent out of state for use in boiler-fuel applications and it is unclear if this still being practiced; (8) very little if any is buried in in-state bulky waste landfills; and (9) very little is burned at in-state RRFs.

2.3 Waste Projections

Over the next twenty years, a variety of factors will influence the generation and disposal of waste in Connecticut. These factors include population growth, Connecticut's per capita generation of waste, and the success, or lack thereof, of waste diversion programs. In updating Connecticut's Solid Waste Management Plan, a set of assumptions was used to develop several scenarios of how waste would be managed for the next 20 years. The scenarios have been developed for MSW, Ash Residue from MSW RRFs, and C&D waste/oversized MSW. These assumptions and scenarios are described below, along with the resulting projections.

2.3.1 Assumptions and Scenarios

In developing the waste projections, R. W. Beck, Inc. utilized a combination of solid waste data reported to the CT DEP; estimates of data not captured by the reporting system; and the development and use of a regression analysis based on Connecticut's population and the Gross State Product, resulting in assumptions of a 1.6 percent annual increase for some components of the solid waste stream. (see Appendix J).

In updating Connecticut's Solid Waste Management Plan, four broad scenarios were considered.

1. The most aggressive MSW scenario considered was one in which the diversion from disposal rate would be sufficient to eliminate the projected in state disposal capacity shortfall. That rate would equate to achieving a 61 percent MSW diversion from disposal rate by 2024. The Department recognizes that this would be a very difficult goal to achieve, at least over the twenty-year planning period of this Plan. However, the strategies presented in this plan will go a long way in starting the State on this path, but reaching that goal will require strategies beyond those discussed in this Plan.
2. A more readily achievable, yet still aggressive scenario would ensure that the amount of MSW annually requiring disposal would remain constant from FY2005 to FY2024. This would require the development of an aggressive waste diversion program that would increase the current MSW diversion rate from 30 percent to 49 percent in 2024. Since data regarding the generation of C&D waste/oversized MSW is incomplete, it is difficult to set a specific goal for reducing the amount of such waste requiring disposal. However, under all scenarios, steps will be taken to maximize the amount of C&D waste/Oversized MSW diverted from disposal.
3. A more moderate scenario would require a waste diversion program that would increase the current MSW diversion rate from 30 percent to 40 percent and maximize the C&D waste/Oversized MSW diversion from disposal.
4. The last scenario considered was one that would result in the State's maintaining its current 30 percent diversion rate for MSW and 7 percent diversion rate for C&D waste/Oversized MSW.

Scenarios two, three, and four would result in an MSW and C&D waste/Oversized MSW disposal capacity shortfall, absent the development of any new in-state disposal capacity. That is, Connecticut would not have enough disposal capacity in-state to manage the MSW or the C&D waste/Oversized MSW generated in the state.

2.3.2 MSW Projections

Based on the scenarios listed above, and assuming no new waste disposal was developed in Connecticut, the following outcomes would result.

The State of Connecticut would generate 5,233,000 tons of MSW in FY2024.

- With a 61 percent diversion rate achieved in FY2024, approximately 3,167,000 tons of MSW would be diverted from disposal in FY2024, leaving 2,066,000 tons of MSW to be disposed in FY2024. Using the in-state disposal capacity projected for FY2024, this would result in a zero in-state capacity shortfall.
- With a 49 percent diversion rate achieved in FY2024, approximately 2,553,000 tons of MSW would be diverted from disposal in FY2024, leaving 2,680,000 tons of MSW to be disposed. If no new in-state disposal capacity were added, this

would result in an in-state disposal capacity shortfall in FY2024 of 614,000 tons of MSW. That is, 614,000 tons of MSW would have to be exported to disposal facilities outside of Connecticut.

- If the waste diversion rate reached 40 percent by FY2024, approximately 2,093,000 tons of MSW would be diverted from disposal in FY2024 and, assuming no new in-state disposal capacity is added, the in-state MSW disposal capacity shortfall in FY2024 would be 1,074,000 tons of MSW.
- If the waste diversion rate remained level at 30 percent through 2024, approximately 1,570,000 tons of waste would be diverted from disposal in FY2024 and, with no new in-state disposal capacity added, the in-state disposal capacity shortfall in FY2024 would be 1,597,000 tons of MSW

2.3.3 MSW RRF Ash Residue Projections

With no new in-state MSW RRF capacity being developed, and assuming full usage of existing capacity, approximately 504,000 tons of MSW RRF ash residue would require disposal in FY2024. If no new ash landfills were established between now and FY2024, there would be no disposal capacity available for this ash beginning in FY2019. It would all therefore have to be disposed out-of-state.

2.3.4 C&D Projections

If Connecticut increased its C&D/oversized MSW diversion rate from the current 7 percent to an aggressive 48 percent in FY2024, the disposal capacity shortfall for this waste stream would decrease from the current 940,000 tons to 801,000 tons in FY2024.

If the C&D/oversized MSW diversion rate were capped at 40 percent, the disposal capacity shortfall would be 925,000 tons in 2024.

If the C&D/oversized MSW diversion rate remained level at 7 percent over the next 20 years, the disposal capacity shortfall would be 1,436,000 tons by 2024.

2.4 Key Factors Affecting Solid Waste Management in Connecticut

The context for solid waste management in Connecticut has changed substantially since the last statewide solid waste management plan was adopted in 1991. Among the key issues that will shape solid waste management in coming years are the following:

- **Connecticut is projected to have an increasing shortfall of MSW and C&D waste/oversized MSW in-state disposal capacity.**

By FY2010, Connecticut is projected to have a shortfall of in-state MSW disposal capacity of 619,000 tons. The shortfall is expected to remain at this level until FY2024, but only if the State can achieve a 49 percent disposal diversion rate by FY2024. The shortfall will be even greater if Connecticut does not achieve this diversion rate, or if any of Connecticut's disposal facilities unexpectedly cease operation. However, the shortfall could be eliminated entirely by FY2024 if Connecticut achieves a 61 percent diversion rate by FY2024.

The existing C&D waste/oversized MSW in-state disposal capacity shortfall is expected to increase substantially by FY2024. Connecticut needs to substantially increase recovery of C&D/Oversized MSW in the coming years. However, because data regarding solid waste being delivered to in-state waste facilities is reported as "mixed C&D" waste or bulky waste and is not broken down by waste streams, it is difficult to estimate the portion of each that can be potentially recovered. It is therefore also difficult to estimate with accuracy the amount of C&D disposal capacity that will be required throughout the planning period.

- **Supply contracts for Connecticut's RRF facilities are beginning to expire.**

Most of the contracts requiring municipal agencies to deliver determined quantities of waste to resources recovery facilities, in exchange for certainty of disposal capacity, will be expiring over the next ten year period, the same time that other factors affecting Connecticut RRFs (public versus private control of disposal capacity, bonds being paid, price RRFs receive for the energy they generate, etc.) will come into play. This will affect the pricing of disposal services in the State, open up new opportunities for contractual agreements by Connecticut towns and create uncertainty for the State's six resources recovery facilities. Expiration of these contracts, and private ownership of the RRFs, will also mean that those RRFs will have a greater ability to accept out of state waste, potentially forcing Connecticut municipalities to go to more expensive, less reliable out of state options. This would also further limit Connecticut's ability to enforce recycling requirements.

- **There is increasing out-of-state capacity for solid waste disposal.**

A large amount of capacity is currently available for MSW and bulky waste disposal in other states in the mid-Atlantic and mid-West regions, as described in Appendix F. The amount is anticipated to grow in coming years, notwithstanding some possible restrictions on some facilities, especially those accepting bulky wastes.

- **Solid waste is a commodity.**

The Supreme Court has ruled that solid waste is a commodity subject to inter-state commerce laws. This means that government agencies may not restrict the flow of solid waste across state borders and has further enhanced the regional market for disposal capacity.

- **Recycling and solid waste management services are increasingly privately run and market driven.**

Increasingly, solid waste management services are being privatized. Moreover, across the nation there is increasing interest in maximizing the overall cost and performance efficiencies of integrated waste management systems, and this often leads to innovative approaches to providing market-based incentives that can increase recycling and other diversion efforts. Municipalities can provide such incentives through contracting terms, ordinances, and pricing policies and municipally owned waste and recycling facilities.

- **Funding is inadequate and Connecticut's waste diversion infrastructure is stagnant.**

In contrast to the rapid growth of the early 1990s, Connecticut's efforts to promote and maximize source reduction, recycling, and composting have declined, and the waste disposal diversion infrastructure has not grown appreciably in the last eight years. Many stakeholders agree there is a need for aggressive new efforts to kick-start new recycling, especially for C&D, food waste and electronics for which recycling rates are very low.

- **Nationally, recycling of non-traditional material streams has grown significantly.**

Nationwide, recycling programs are increasingly targeting so-called non-traditional recyclables such as some types of construction & demolition wastes (e.g., asphalt roofing shingles, gypsum board), food wastes, tires, industrial wastes and other special wastes. Connecticut's infrastructure has yet to move aggressively into many of these new arenas.

- **National and global recycling markets have grown substantially.**

Fortunately, national and global economics are much more attractive for investment in recycling infrastructure. For many traditional recyclables such as most paper grades, aluminum, PET and HDPE plastics, high color-sorted glass and others, companies that use recycled materials as feedstock are in need of greater amounts of post consumer material. In contrast to the early 1990s, these firms are now allies of recycling enthusiasts and are searching for opportunities to reinvigorate recycling programs to increase the quantity and quality of recovered material supplies. Substantial growth in export markets, especially to China, is further increasing the demand.

- **Demonstration that very high waste diversion rates in other states and communities have been achieved.**

Some states have demonstrated the potential to achieve very high waste disposal diversion rates. For example, California, Massachusetts and Oregon are all in the high forty percent range, and some communities in California have achieved diversion rates well in excess of fifty percent, and have adopted goals of seventy percent or higher.

- **There is growing interest in product stewardship and producer responsibility policies.**

A growing number of laws in Europe, Canada and Asia require manufacturers to take a degree of financial and/or physical responsibility for achieving recycling and other waste management objectives. In the U.S., state governments, including Connecticut, are increasingly calling for shared responsibility under the framework of product stewardship agreements or laws. To date, these efforts have resulted in only limited success.

2.5 Addressing Key Issues That Will Determine Connecticut's Future Directions

This Plan addresses the following key issues that are at the heart of Connecticut's solid waste management future.

- **To what extent should Connecticut seek to increase waste diversion through source reduction, recycling and composting? How can Connecticut accomplish this?**

This Plan charts an aggressive course toward increasing Connecticut's current waste diversion levels to 49 percent or even to 61 percent by FY2024, from current levels of about 30 percent for MSW. The reasons for these aggressive objectives are:

1. These targets will allow MSW disposal quantities to remain at FY2005 levels through FY2024 and stem any growth in the amount of MSW requiring disposal (49 percent target) or will eliminate the projected in-state disposal capacity shortfall by FY2024 (61 percent target);
2. Waste diversion from disposal (through source reduction, reuse, recycling) has tremendous environmental benefits, including reduced greenhouse gas generation, reduced energy and water use; fewer emissions of air and water pollutants; conservation of natural resource;
3. These aggressive targets are in line with the State's long-term vision for a shift from waste management to resource management, as discussed in the following chapter.
3. The timing of other states moving aggressively in these areas will allow Connecticut to coordinate with and take advantage of these efforts.

The Plan aims to achieve these objectives through a combination of targeted growth in diversion from disposal (through increased source reduction, reuse, and recycling) for key material including C&D waste and food waste, and by improving, revitalizing, and/or building the institutional, funding, planning and other programs needed to ensure long-term growth and continual improvement in Connecticut's waste reduction infrastructure. These strategies are covered in detail in Chapters Four and Five.

- **To what extent should Connecticut seek to establish sufficient in-state disposal capacity for all MSW and bulky waste generated in the State?**
  - This Plan reflects Connecticut's preference to maintain sufficient in-state disposal capacity for both MSW and C&D wastes/Oversized MSW (bulky wastes). However, the Plan also acknowledges that this is probably not possible, especially for bulky wastes. Connecticut will continue to export solid waste to other states for disposal, and such exports are likely to increase for some time. The degree to which this in-state disposal capacity shortfall would continue would be determined by the availability and reliability of the out-of-state disposal options and the acceptability of the environmental and economic risks associated with the use of those facilities. At the present time options do exist for disposal of these wastes. While it is good public policy to manage the majority of Connecticut's wastes within its borders to better assure that waste is managed in accordance with the statutorily required hierarchy for waste management, it must be recognized that the State does not control all the market forces that influence the development and location of new waste management facilities.
- **How can Connecticut ensure that its waste management infrastructure will grow and adapt to changing conditions over time?**
  - This Plan proposes a range of strategies to establish long-term, stable funding and to strengthen Connecticut's planning, measurement and institutional capacity to support and promote integrated solid waste management programs at all levels. These include stronger local and state planning, improved measurement and tracking activities, and establishment of capacity for market development, technical assistance and product stewardship.

Chapter 3
FROM WASTE MANAGEMENT TO RESOURCE MANAGEMENT: A LONG-RANGE VISION FOR CONNECTICUT

3.1 Vision Statement

Connecticut's long-range vision for solid waste management is to:

- Significantly transform our system into one based on resource management through shared responsibility of everyone involved in the production, use and end-of-life management of products and materials in the State;
- Shift away from the "throwaway society," toward a system that promotes a reduction in the generation and toxicity of trash, and where wastes are treated as valuable raw materials and energy resources, rather than as useless garbage or trash; and
- Manage wastes through a more holistic and comprehensive approach than today's system, resulting in the conservation of natural resources and the creation of less waste and less pollution, while supplying valuable raw materials to revitalize economies.

Achieving this vision will require all of Connecticut's citizens to identify and take advantage of opportunities to significantly reduce the amount of waste generated in the State, increase the amount of recycling and reuse, and manage the waste that must be ultimately disposed of in an efficient and environmentally protective manner. The role of the State is to implement policies and programs that catalyze all parties to move toward this vision, in a manner consistent with the guiding principles listed below. This means promoting action through information, research, education, incentives, partnership building and financial assistance to municipalities and regional waste management entities. It also means continuing, and refining over time, the State's environmental regulatory, permitting, and enforcement functions, as well as State purchasing policies and activities. Connecticut must foster responsibility at multiple levels (individual, corporate, government) through a variety of means. Product manufacturers will increasingly be expected to consider how their products and packaging will be managed at the end of their useful lives, including the need to design products that are reusable, recyclable or compostable, and that incorporate fewer toxic materials. Manufacturers, other companies in the product supply chain, and their customers will also increasingly be expected to share in funding and implementing reuse and recycling programs. Individuals and organizations will increasingly be expected to make wise purchasing and waste management decisions and to pay the true cost of managing waste, including the cost impacts of their waste generation and disposal practices. Government may, over time, reduce its role in

managing some wastes, while those that produce, sell, and use products may assume greater responsibility for managing products (and their associated by-products) at the end of their useful lives.

Failure to achieve this vision will result in the need to build more landfills or resource recovery facilities in Connecticut, or send significantly more waste to out-of-state landfills, with uncertain costs and consequences. Connecticut's citizens, its lawmakers and its government have many decisions to make to address these issues.

Some necessary changes are already underway. For example, CT DEP's 1999 Proposed Statewide Solid Waste Management Plan, though never formally adopted, identified critical issues and approaches, many of which the CT DEP has been pursuing in recent years. CT DEP has actively sought to increase source reduction and recycling, launched pilot projects and basic research related to food waste composting, and has worked with other states to promote product stewardship through such organizations as the Northeast Recycling Council, the Northeast Waste Management Officials Association and the Product Stewardship Institute. Meanwhile, CRRA has systematically sought to identify suitable locations for new landfill disposal capacity, has developed two museums to educate the general public and children about waste management, and with its partners, is expanding recycling capacity and the range of materials recovered. Municipalities and regions have worked to boost recycling and ensure sound, efficient waste management and recycling systems. And in many parts of the State there are examples of businesses, non-profit organizations, schools and others who are working to treat wastes as resources and enhance the environment.

3.2 Guiding Principles

The following general principles will guide the development and implementation of Connecticut's Solid Waste Management Plan:

- **Public Health and Safety.** A fundamental requirement of proper solid waste management is the need to ensure public health and safety, including those involved in generating, collecting, processing, recycling and/or disposing of wastes. Consideration must be made with regard to eliminating toxics in products and packaging and the transportation of waste. Solid waste management facilities will continue to be held to strict standards to ensure that public health and safety are protected.
- **Equity and Fairness.** Waste management practices will be implemented in a way so that no segment of the population should bear disproportionate share of the risks or consequences of environmental pollution. This includes the need to adhere to the principles of environmental justice, so that low income and minority populations are not unduly impacted by the environmental effects of solid waste management practices, policies and programs.
- **Integrated Waste Management Hierarchy.** Solid wastes generated in Connecticut will continue to be managed in accordance with the integrated waste

management hierarchy as defined by Connecticut General Statutes 22a-228(b). The hierarchy is as follows: source reduction; recycling; composting of yard waste or vegetable matter; bulky waste recycling; resources recovery or waste-to-energy plants; and incineration and land-filling.

- **Shared Responsibility.** Solid waste management efforts in Connecticut will be guided by the principle of shared responsibility or "product stewardship". This means that all parties involved in designing, supplying materials, manufacturing, selling, and using a product will share responsibility for environmental impacts at every stage of that product's life. Local governments and consumers have historically borne the burden of waste management. Yet, they have little control over the materials used in the construction of products and packaging which may influence the amount of waste generated, the toxicity of the product or packaging, and its ultimate ability to be recycled or reused. Because of their central role in the product lifecycle, manufacturers must share the financial and/or physical responsibility for collecting and recycling products at the end of their useful lives. Shared responsibility also involves building partnerships and coalitions to solve specific waste management problems, and Connecticut will work with all stakeholders in an effort to gain mutual understanding and implement innovative solutions.
- **Economic Efficiency and Environmental Sustainability.** Product manufacturing, consumption and management of discards can cause numerous environmental impacts. These include: (1) depletion of natural resources such as forests and minerals; (2) depletion of habitat associated with these resources; (3) use of energy during resource extraction, materials processing, manufacturing, and in waste management systems; and (4) release of greenhouse gases, and other air and water emissions during these life cycle stages. Waste management systems should be designed to minimize these impacts over the product lifecycle. Systems to collect, process, reuse, recycle or dispose wastes should be designed and operated to minimize cost and maximize effectiveness on a system wide basis. Furthermore, through reuse and recycling, discarded materials will be processed to market specifications and used as raw material by business enterprises, thereby creating jobs and benefiting the economy. To the extent possible, waste management systems will be designed to harness and take advantage of market forces. This allows programs to be highly resilient, adapting to new circumstances over time, such as changes in markets and technologies. Natural resource extraction and product manufacturing impacts most often occur outside of Connecticut, while waste collection and processing impacts are directly experienced in the State. Therefore, Connecticut's resource management system will yield environmental benefits within the state and region.

3.3 Goals

The goals of the State Solid Waste Management Plan are:

Goal 1: Significantly reduce the amount of Connecticut generated solid waste requiring disposal through increased source reduction, reuse, recycling and composting.

- Take aggressive actions toward achieving a diversion from disposal rate sufficient to eliminate the projected in state disposal capacity shortfall. That rate would equate to achieving a 61 percent MSW diversion from disposal rate by FY2024. Recognizing that this would be a very difficult goal to achieve over the twenty-year planning period of this Plan, the strategies presented in this plan, at a minimum, look to maintain the current amount of MSW disposed annually by reducing our per capita disposal rate from 0.76 tons/ person/year in FY2005 to 0.73 tons/person/year in FY2024 by achieving at least a 49 percent MSW disposal diversion rate by FY2024.
- Significantly reduce the amount of construction and demolition or oversized MSW disposed by increasing the current disposal diversion rate through source reduction, reuse and recycling.

Goal 2: Manage the solid waste that ultimately must be disposed of in an efficient, equitable and environmentally protective manner, consistent with the statutory hierarchy.

Goal 3: Adopt stable, long-term funding mechanisms that provide sufficient revenue for state, regional and local programs while providing incentives for increased waste reduction and diversion.

With the vision, guiding principles and goals in place, Connecticut's Solid Waste Management Plan will result in a comprehensive approach to managing the State's solid waste. All of Connecticut's citizens and businesses will play critical roles in achieving these goals.

Chapter 4
MOVING TOWARDS CONNECTICUT'S VISION: OBJECTIVES AND STRATEGIES

4.1 Overview

Moving toward the vision of treating wastes as resources, as described in Chapter Three, will take time and a coordinated commitment by Connecticut residents, businesses, government agencies, waste management and recycling firms, product manufacturers and others. Success will require substantial changes in Connecticut's current solid waste management system.

While Connecticut can be proud of the solid waste management system it has built and the many efforts to further enhance it, continuing to move toward the vision outlined in this Plan requires a systematic reinvigoration of source reduction, recycling and composting efforts, combined with enhancement and expansion of a support network to promote innovation and growth in waste diversion from disposal over the long term. This chapter presents a blueprint for this effort.

To bring Connecticut's vision closer to reality, Connecticut's local and state agencies, citizens, businesses, and industries will work towards achieving the following objectives:

1. **Source Reduction –** Catalyze shifts in consumer, business and product manufacturing, and solid waste processing practices that reduce the amount and toxicity of waste generated in Connecticut.
2. **Recycling and Composting –** Move aggressively to strengthen Connecticut's public and private reuse, recycling and composting efforts and infrastructure to increase the quantity and quality of recovered materials and to build resilient, highly efficient and continually improving programs to reduce the amount of solid waste Connecticut disposes, both now and in the future. Therefore Connecticut needs to maximize recycling and composting for all types of solid waste generated in the State. Throughout the Plan composting efforts refer only to the composting of source separated organic material.
3. **Management of Special Wastes and Other Types of Solid Waste –** Maximize source reduction, recycling, and beneficial use of special waste and other types of solid waste in a manner that protects human health and the environment; and also assure that special waste and other types of waste that require disposal are disposed in compliance with the State's solid waste management hierarchy in facilities that meet all regulatory standards for protectiveness of human health and safety, natural resources and the environment.

4. **Education and Outreach –** Significantly increase awareness and understanding of waste management needs, impacts and the critical social, economic, and environmental issues facing Connecticut, and build support for programs to engage citizens in actions needed to maximize waste reduction and recycling and minimize the need for additional disposal capacity.
5. **Program Planning, Evaluation and Measurement –** Enhance local, state and regional planning, measurement and program evaluation practices to drive continual progress towards achieving Connecticut's waste management goals.
6. **Permitting and Enforcement -** Ensure that permitting and enforcement decisions promote the goals of the Plan and are made in a manner that is fully protective of human health and the environment; promote continuous improvement of the environmental permit application review and decision making process; achieve the highest level of environmental compliance through predictable, timely, and consistent enforcement and effective compliance assistance where appropriate; and improve communication with municipalities, business, industry, and the public on the regulatory process in order to assure compliance with environmental requirements.
7. **Management of Solid Waste Requiring Disposal –** Assure that the need for new disposal capacity is minimized, that existing solid waste facilities are used as efficiently as possible, and that the public is fully aware of the potential need for and impacts of disposal options and specific proposals, through a robust public participation process.
8. **Funding –** Adopt stable, long-term funding mechanisms that provide sufficient revenue for state, regional and local programs while providing incentives for increased source reduction and recycling.

With this Plan, Connecticut is charting an aggressive, transforming course in the area of solid waste management. Waste that cannot be source reduced, recycled or composted will need to be disposed in an efficient, equitable, and environmentally protective manner. Finally, in order to achieve these goals, it will be necessary to adopt stable, long-term funding mechanisms that provide sufficient revenue to implement this Plan.

New technologies to recover energy in an environmentally sound manner from solid waste which cannot be source reduced or recycled or composted will be explored and assessed and resources recovery facilities will continue to employ up-to-date technology to also play a vital role in recovering energy from the remaining waste stream in an efficient, environmentally sound manner. Finally, landfills will be used as a last resort to manage remaining wastes not suitable for materials or energy recovery.

However, the Department also recognizes that, even if the aggressive goal identified in this Plan for reducing the amount of MSW disposed is met, there will still be a shortfall of in-state MSW disposal capacity. The State must identify and assess risks and plan prudently for how the State will deal with potential increased future reliance on out of state disposal capacity for MSW, construction and demolition waste, and

oversized MSW, and must identify the circumstances under which new in-state disposal capacity would be consistent with this Plan. At the same time, the State must try to assure that additional disposal capacity available to Connecticut waste generators does not create disincentives to the development and utilization of the critical recycling and composting infrastructure that is the centerpiece of this Plan.

4.2 Projected Connecticut Solid Waste Generation and Disposal: the Framework for the Plan

Tables 4-1, 4-2, and 4-3 present projections for the generation, disposal diversion, disposal, and in-state disposal capacity for Connecticut generated solid waste for the period FY2005 through FY2024. The projections found in these tables were used to develop the disposal diversion goal for MSW and to predict future needs for disposal capacity for Connecticut generated MSW, RRF ash residue, and construction and demolition ("C&D") waste/Oversized MSW. More detailed tables can be found in Appendix J.

4.2.1 MSW

Table 4-1 provides projections of Connecticut MSW generation and in-state disposal capacity for the planning period. The amount of MSW generated in Connecticut is projected to increase by approximately 1.4 million tons over the planning period, from 3.8 million tons in FY2005 to 5.2 million tons in FY2024. Connecticut must meet its 49 percent waste disposal minimization goal in order to maintain a consistent tonnage of MSW disposed from FY2005 through FY2024 (i.e. approximately 2.7 million tons/year). Even if Connecticut achieved this 49 percent goal, in FY2024 the annual in-state disposal capacity shortfall will be approximately 614,000 tons. If Connecticut fails to meet its 49 percent disposal diversion goal, then the following is projected to occur:

- If the maximum MSW disposal diversion rate attained is 40 percent, then by FY2024 Connecticut will need to dispose approximately 3.1 million tons of MSW annually and the annual in-state disposal capacity shortfall will be approximately 1.1 million tons.
- If the MSW disposal diversion rate remains at the current 30 percent through the year FY2024, then by FY2024 CT will need to dispose 3.7 million tons of MSW annually and the annual in-state disposal capacity shortfall will be 1.6 million tons.

Table 4-1
Projections of Connecticut MSW and In-State Disposal Capacity
FY2005 – FY2024

Fiscal Year	MSW Generated (000 tpy (1)) (2)	Percent Diverted (3)	MSW Diverted (000 tpy)	MSW Disposed (000 tpy)	In-State Disposal Capacity (000 tpy) (4)	In-State Capacity Shortfall (000 tpy) (5)
2005	3,805	30	1,133	2,671	2,344	327
2010 (6)	4,118	35	1,432	2,685	2,066	619
2015	4,476	40	1,781	2,695	2,066	629
2020	4,879	45	2,185	2,694	2,066	628
2024	5,233	49	2,553	2,680	2,066	614

If the maximum MSW disposal diversion rate attained is 40 percent (attained in FY2015 and maintained through FY2024) then by FY2024 CT will need to dispose 3,140,000 tons of MSW annually and the annual in-state disposal capacity shortfall will be 1,074,000 tons.

If the MSW disposal diversion rate remains at the current 30 percent through the year FY2024, then by FY2024 CT will need to dispose 3,663,000 tons of MSW annually and the annual in-state disposal capacity shortfall will be 1,597,000 tons

Projections were based on the following assumptions:

1. TPY is defined as Tons per Year.
2. MSW generation projections based on projections of Connecticut's population from US Census Bureau and the Gross State Product.
3. The percent of MSW diverted from disposal = the amount of MSW recycled and composted divided by the amount of MSW generated. For FY2005, the 30 percent diversion rate was projected based on FY2003 reported and estimated amounts of material recycled and composted; the estimated amounts included additional commercial recycling (not reported) and estimates of bottle bill material recycled.
4. In-State MSW Disposal Capacity = In-State Landfill Capacity (based on amount of MSW disposed in FY2004) plus In-State Resource Recovery Facility capacity (based on the five-year average processed at CT RRFs FY2000-FY2004); No new disposal capacity added.
5. In-State Disposal Capacity Shortfall = MSW disposed minus In-State Disposal Capacity.
6. Hartford Landfill closes in June 2006 resulting in a reduction of 84 (000) TPY of MSW (process residue) starting in FY2007; Windsor-Bloomfield Landfill closes in December 2007 resulting in a reduction of 26 (000) tons of MSW disposal capacity starting in FY 2008 and no disposal capacity for this landfill thereafter. For planning purposes, Wallingford RRF is assumed to close in June 2009 resulting in a reduction of 143 (000) TPY of MSW processing capacity. To date, no decision has been made regarding the Wallingford RRF and it may remain open beyond FY2009.

4.2.2 RRF Ash Residue

Table 4-2 provides projections of the generation of Connecticut RRF ash residue requiring disposal and in-state disposal capacity, assuming that no new MSW RRF capacity will be built in-state. Connecticut's six MSW RRFs generate ash residue requiring disposal in quantities that are between 23 percent to 33 percent (average of 25 percent) of the weight of the waste incinerated, not including the metal that is recovered from the ash. Currently, Connecticut's RRF generated ash residue is disposed in landfills, both in-state and out-of-state. Connecticut has two lined ash landfills. One (the CRRA Hartford ash landfill) will be reaching capacity in late 2008. The other (Wheelabrator owned Putnam landfill) is projected to have additional capacity through FY2018 and part of FY2019.

Table 4-2
Projections of Generation of Connecticut RRF Ash Residue Requiring Disposal and In-State Disposal Capacity (Assumes No New MSW RRF Capacity Will be Built in Connecticut) FY2005 – FY2024

Fiscal Year	Projected Remaining In-State Ash Disposal Capacity (000 tons) (1) (2)	MSW Processed at CT RRFs (000 tpy)	RRF Ash Residue Requiring Disposal(3)/ Disposed In-State (000 tpy)	Capacity Shortfall (000 tons)
2005 (4)	7,501	2,209 (5)	551/506	0
2010 (6) (7)	4,928	2,066	504/504	0
2015	2,406	2,066	504/504	0
2020	0	2,066	504/0	504
2024	0	2,066	504/0	504

Projections were based on the following assumptions:

1. Assumes current ash disposal capacity decreasing annually with amounts shown.
2. In-State RRF Ash Disposal sites are the Hartford Landfill (CRRA) and the Putnam Ash Landfill (Wheelabrator Putnam, Inc).
3. Assumes ash generation rate reflects average MSW RRF ash generation requiring disposal per year based on the period FY2000-FY2004.
4. Assumes that ash disposal capacity at the Hartford Landfill will be available to dispose of RRF from Mid-CT RRF until October 2008.
5. Based on five-year average of waste burned at In-State RRFs for the period (fiscal years) 2000 through 2004.
6. Assumes that Bristol's RRF ash is disposed In-State after its current contract with Seneca Meadows landfill in NY expires in June 2008.
7. For planning purposes, Wallingford RRF is assumed to close in June 2009, resulting in a reduction of 46,056 TPY of MSW RRF ash residue disposed annually based on the period FY2000-FY2004. To date, no decision has been made regarding the Wallingford RRF.

4.2.3 C&D Waste/Oversized MSW

Table 4-3 provides projections of Connecticut generated C&D waste/Oversized MSW and in-state disposal capacity, assuming no increase in the diversion from disposal. As a result of Connecticut's limited landfill disposal capacity for C&D waste and oversized MSW and limited efforts to source reduce or recycle this waste stream, the State already faces a significant in-state disposal capacity shortfall. It is projected that if Connecticut does nothing to improve efforts in source reduction and recycling, the in-state disposal capacity shortfall will increase from 940,000 tons in FY2005 to 1.4 million tons per year by FY2024.

Table 4-3
Projections of Connecticut C&D Waste/Oversized MSW (1) Generation (2) and In-State Disposal Capacity
Assuming No Increase in Diversion from Disposal
FY2005 – FY2024

Fiscal Year	C&D Waste /Oversized MSW Processed or Disposed by CT Solid Waste Facilities(3) (000 tpy)	Percent C&D Waste /Oversized MSW Diverted from Disposal (4)	C&D/Waste Oversized MSW Disposed (5) (000 tpy)	Estimated In-State Disposal Capacity (6) (000 tpy)	C&D Waste /Oversized MSW Capacity Shortfall (7) (000 tpy)
2005	1,145	7	1,066	126	940
2010 (8)(9)	1,240	7	1,153	67	1,086
2015	1,342	7	1,248	73	1,175
2020	1,453	7	1,351	79	1,272
2024 (10)	1,548	7	1,440	4	1,436

Projections were based on the following assumptions:

1. "Oversized MSW" is not consistently reported; sometimes it is reported as "bulky" or C&D waste (included in this table); sometimes it is reported as MSW (included in tables presenting CT MSW figures); CT definition for bulky waste and MSW contribute to this confusion.
2. The figures presented in this table are based on C&D waste and "bulky waste" data reported by CT C&D volume reduction facilities (VRFs), CT transfer stations (TSs), CT Dept. of Transportation and CT landfills (LFs). This table does not include figures regarding clean wood reported recycled by CT recycling facilities or by CT municipalities. Figures reported for FY2004 have been escalated 1.6 percent to arrive at FY2005 estimates.
3. C&D waste projections based on FY2004 C&D waste and "bulky waste" data reported to DEP (see footnote #1) and assumes a 1.6 percent annual increase in the amount of such waste generated.
4. The 7 percent diversion (recycling) rate is the CT current C&D waste diversion rate as calculated from data submitted to the CT DEP as described in footnote #2. It does not include most of the clean fill generated and recycled or reused.
5. Disposed both in-state and out-of-state.
6. In-State disposal includes current landfill capacity for FY2005. After FY2005, assume landfills accept 1.6 percent more waste per year.
7. C&D Waste Disposal Capacity Shortfall = C&D waste Oversized MSW disposed minus C&D waste/Oversized MSW In-State Disposal Capacity.
8. Assumes Hartford Landfill which is currently receiving 27 (000) tons of bulky waste and oversized MSW (i.e. in FY2005) closes in 2006
9. Assumes Windsor-Bloomfield Landfill receiving 39, 000 tons in FY2005 closes December 2008, resulting in a reduction of 20 (000) tons of disposal capacity in FY2009 and an additional reduction of 20 (000) tons of disposal capacity in FY2010.
10. Assumes the Manchester Landfill extends its permit and continues to operate, closing in 2022.

4.3 Objectives And Strategies

To move forward in addressing these critical issues, the Plan proposes Objectives and Strategies that will position Connecticut to best manage the State's solid waste for the next two decades, with a particular focus on the period 2006 through 2010. This Chapter outlines the eight Objectives developed to support the overall goals of the Plan and is structured to include a statement of the objective, an overview of the issue, a description of current practices, barriers, opportunities, and specific strategies. Chapter five contains a comprehensive listing of all the strategies and outlines the type

of action needed, establishes priorities, identifies costs, time frames, and lead responsibilities.

4.3.1 Objective 1. Source Reduction

The objective of source reduction is to: catalyze shifts in consumer, business and product manufacturing, and solid waste processing practices to reduce the quantity and toxicity of solid waste generated in Connecticut (including the quantity and toxicity of residue generated by RRFs and construction and demolition volume reduction facilities).

Overview – Source Reduction

Source reduction (consuming and throwing away less) is also referred to as pollution prevention and results in a reduction in the amount and/or toxicity of waste generated. Waste is generated throughout the life cycle of a product—beginning with extraction of raw materials, throughout transportation, processing and manufacturing, during use, and by its disposal at the end of its useful life. Source reduction can be defined as any change in the design, manufacturing, purchase, or use of materials or products (including packaging) that reduces the amount or toxicity of waste associated with those materials or products. It is the highest priority in the hierarchy of effective solid waste management and is generally acknowledged to have the greatest benefits in terms of reducing waste management and product manufacturing costs, and reducing environmental burdens like natural resource use, energy use and air and water emissions. It is also perhaps the most challenging integrated solid waste management option since it involves changes in well-established manufacturer and consumer practices and requires businesses, industries, and consumers to reduce both the quantity and toxicity of waste that they generate. Product and material reuse will be included in this discussion of source reduction.

Current Source Reduction Practices

Current Source Reduction Practices for Reducing the Toxicity of Solid Waste

Major concerns regarding toxicity in solid waste relate to the presence of toxic substances such as mercury, lead, dioxin, and cadmium in products and materials that are disposed and the generation of those toxic substances during the manufacturing process. Connecticut encourages manufacturers and industries to reduce the toxicity of their consumer products. There has been significant progress in reducing the toxic content of certain products. Some of these actions have been voluntary, while others have been legislated and include:

- The CT DEP's Pollution Prevention Plan, though dated, establishes goals and identifies strategies to reduce the quantity and toxicity of wastes discharged to the land, air, and waters of the State.
- In 2002, Connecticut's legislature enacted Public Act 02-90, An Act Concerning Mercury Education and Reduction. This law established a comprehensive

program aimed at the virtual elimination of mercury in consumer, household and commercial products. The first provisions of the law were effective July 1, 2002 with full implementation of all requirements by July 1, 2006 (statute recently amended for full implementation to be achieved by July 1, 2013). This law was codified into CGS Sections 22a-612-625 Mercury Reduction and Education. The following highlights certain sections of the law:

- Restrictions on novelty sales;
- Sale bans for mercury containing fever thermometers and mercury containing dairy manometers;
- Consumers are to be informed by product and packaging labels and warnings in care and use manuals that indicate that products contain mercury and how they should be managed;
- Manufacturers of mercury-added products are required to reduce their mercury content and are required to develop collection systems for those products to ensure that mercury containing products are properly managed at the end of their useful life;
- Retailers who sell mercury-added lamps to industrial, commercial, or office building owners are required to notify the purchaser or person who replaces or removes such lamps that they contain mercury and cannot be thrown out in the garbage for disposal; and
- Dental offices are required to store, use, and handle mercury to minimize exposure under CT DEP adopted Best Management Practices. Vocational dental education or training schools are required to develop and to implement plans to properly handle and recycle or dispose of waste elemental mercury and amalgam.

- Paint manufacturers voluntarily stopped producing mercury-containing paints in 1991.
- Manufacturers of computers and other consumer electronics products are starting to reduce the use of lead, mercury and other toxic substances. To some degree, this is in response to legislation in the European Union that requires the elimination of these materials.
- Connecticut statutes require reduced mercury content of alkaline manganese and zinc carbon batteries (CGS Sections 22a-256d, 22a-256e). National legislation bans the sale of mercuric oxide button cell batteries and limits the introduction of mercury to alkaline manganese and zinc carbon batteries ("Mercury Containing and Rechargeable Battery Management Act", 1996). Legislation adopted in 2006 phases out the use of mercury in remaining button cell batteries (although mercuric oxide button cell batteries were banned from sale in the1998 Act, remaining types of button cell batteries, such as silver oxide and alkaline manganese button cell batteries still contain some mercury).

- Toxics in packaging legislation adopted by Connecticut and 18 other states and several foreign countries has resulted in a steady decline in the presence of heavy metals in packaging throughout this country. In Connecticut, the sale of packaging with the intentional introduction of lead, mercury, cadmium, or hexavalent chromium was prohibited as of October 1992. In addition, limits have been placed on incidental levels of these metals in packaging (CGS Section 22a-255i). Manufacturers are required to certify that their packaging complies with these laws and provide these certifications to distributors and retailers upon request. Retailers and distributors are encouraged to adopt these requirements into their purchasing specifications and to routinely request certificates of compliance from manufacturers.

  As a member of the Toxics in Packaging Clearinghouse, the CT DEP is currently participating in an assessment being conducted on all types of packaging in the member states in various regions of the country for the purpose of uncovering noncompliant packaging. The CT DEP, in conjunction with the Toxics in Packaging Clearinghouse, will conduct follow-up outreach activity where warranted to bring suppliers and manufacturers into compliance with the toxics in packaging law. Where lack of compliance is egregious, the CT DEP will take appropriate action under its jurisdiction.

- The U.S. EPA signed a Memorandum of Agreement with the American Hospital Association in 1998 that called for a virtual elimination of mercury from hospital waste by 2005. The agreement also promotes the reduction of all wastes generated by the health care industry.

- The CT DEP is working with large institutions in Hartford (including hospitals and college laboratories) to become models of pollution prevention.

- The CT DEP and the Connecticut Department of Administrative Services (DAS) initiated a program to research and promote the purchase of environmentally preferable products by all Connecticut State agencies. In 2006, Governor Rell issued Executive Order No. 14 which required State agencies to procure and use, whenever practicable, cleaning and/or sanitizing products having properties that minimize potential impacts to human health and the environment, consistent with maintaining clean and sanitary State facilities.

- The CT DEP maintains a web page dedicated to pollution prevention and has conducted workshops and case studies and developed certain targeted research projects for such industries as dry cleaning and auto body shops. The web site also has information to assist individuals with reducing waste toxicity generated in the home.

- The U.S. EPA has been heavily involved in many of these areas, including many of the specific efforts identified above. In addition, some Connecticut municipalities have taken steps to educate their residents on how to reduce the generation of waste, especially on the topic of household hazardous waste.

Current Source Reduction Practices for Reducing the Quantity of Solid Waste

Based on solid waste facility reports submitted to the CT DEP, the amount of MSW generated per person (at work and at home) in Connecticut has been rising steadily from an average of 4.8 lbs/person/day in FY1992 (the first year of analyzed data in the CT DEP solid waste management data base) to 5.4 lbs/person/day in FY2003 (this is the most current year of analyzed data). Although some of the observed increase can be attributed to better reporting, there has been a real increase in the amount of trash produced. We have become a "throw-away" society, addicted to buying new things, with the convenience of single use products, and with no general awareness of the environmental costs of that lifestyle. However, a variety of source reduction actions have been taken by some individuals and businesses to reduce the amount of waste they produce. Table 4-4 lists these actions taken and include:

- **Lightweighting of products**: Some effective source reduction measures have been applied to the design and production of products and packaging. Examples include reduction in the amount of aluminum or glass used in a 12-ounce beverage container, or the average thickness of newsprint. Manufacturers have strong incentives for such lightweighting since they directly contribute to their bottom line by reducing their raw material costs and in some cases, fuel costs associated with transportation of packaged goods. Another practice that may increase source reduction is the increase in online newspaper usage, as opposed to subscription to traditional "hard copy" newspapers. Measuring the impact of such efforts on Connecticut is difficult, since the mix of products and packaging in the waste stream is constantly changing. However, a 1998 study conducted by Franklin Associates for the Connecticut Resources Recovery Authority estimated that approximately 155,000 tons per year reduction in MSW generation could be attributed to Connecticut as a result of national, industrial source reduction practices.

- **Consumer and Work Practices**: There has been some effort in Connecticut to promote source reduction practices at home and at work. In the early 1990s, the CT DEP held workshops and drafted fact sheets promoting pre-cycling which encouraged individuals to shop in a more environmentally aware manner, such as by using reusable grocery bags, avoiding throw-away and over–packaged products, and buying less in general. Individuals were also encouraged to generate less waste at the office. Although some of these practices are mentioned in recycling fact sheets on the CT DEP website, a concerted effort to promote waste reduction behavior has not been ongoing.

  The Department of Administrative Services ("DAS") acting pursuant to CGS Section 4a-67b developed and implemented a plan to eliminate by stages, the use of disposable and single-use products in State government. CGS Section 4b-15 requires State agencies to reduce the use of disposable and single-use products in accordance with the DAS plan, however, additional attention is needed in this area.

- **Pay-as-You-Throw:** A small number of Connecticut municipalities and waste haulers have implemented pay-as-you-throw ("PAYT") or unit-based pricing programs for solid waste collection. Under PAYT programs, generators will pay

more if they dispose more waste, thereby creating an incentive for waste generators to produce less waste (i.e., by buying products with less packaging, buying in bulk, buying durable goods instead of disposable goods, reusing things, buying less in general).

- **Re-Use**: Some municipalities operate "swaps" at their transfer stations and recycling drop-off sites to encourage reuse of products. The CT DEP promotes and encourages the use of material exchanges and provides information on material exchanges on their website. Connecticut recently participated in a Northeast Recycling Council project to promote reuse and waste prevention to New England school and municipal purchasing agents by developing an understanding of the economic and environmental benefits of using materials exchanges, as well as State surplus property programs. Also, a building materials reuse business was recently started up in Connecticut and was the recipient of funding from a CT DEP enforcement penalty.

  In addition to consignment shops located throughout the State, there are a number of web-based residential material exchanges and used product websites which have developed loyal followings.

Table 4-4
List of Actions Taken to Reduce the Quantity of Solid Waste

■ unit-based pricing ■ lightweighting (bags, cartons, glass, plastic, bottles, cans) ■ refillable containers ■ elimination of redundant packaging ■ reuse of bags, boxes, etc.	■ bulk dispensers for food ■ materials waste exchanges ■ self-service at cafeterias ■ donation of unused food to charity ■ decreased newsprint weight ■ e-mail ■ double-sided copies ■ decreased junk mail	■ donation of unwanted clothes, appliances, furniture to charity ■ reuse of wood pallets ■ concentrated products (e.g. laundry detergents) ■ more durable appliances ■ repair/reuse of appliances ■ tag sales to promote reuse

Barriers to Achieving Waste Source Reduction

Achieving real progress in source reduction is extremely challenging for many reasons, including:

- Reducing the quantity of waste we generate competes with the ongoing promotion of product consumption;
- Information on the toxicity of waste associated with products, and on less wasteful or toxic alternatives, is not readily available. There is no transparency regarding

the true environmental and human costs associated with increased consumption and disposal;

- Increased consumer reliance on catalog and internet shopping has increased the generation of shipping and packaging materials;
- There are an overwhelming number of issues competing for people's time, concern, and attention. This is just one more issue and people feel no immediate sense of urgency to deal with it;
- Pricing for waste management disposal services, especially for residential services, often does not provide an incentive for reducing waste; and
- While cost incentives exist for manufacturers to reduce the weight of products and packaging, there may not be as strong an economic incentive to reduce toxicity or to make products more durable.

Source Reduction Opportunities and Priorities

The opportunities to reduce the amount and toxicity of waste generated in Connecticut can be grouped by the type of product and/or the type of waste generator. Listed below are priorities for source reduction efforts in Connecticut:

- **Change the consumers purchasing practices to promote sales of less wasteful and less toxic products.**

Consumers must be encouraged to shift their purchasing practices to: when possible, choose products that are reusable and more durable rather than disposable; and choose product alternatives that are made without or with fewer toxic or hazardous components. To make this shift happen, consumers need to understand the need and options for source reduction, have better information about product waste and toxicity, more product choices, and incentives to make those changes.

- **Promote change in business and industry practices to reduce waste generation, including paper waste and waste related to transport packaging. Change practices in the construction industry to reduce the use of products containing toxic substances and to reduce waste.**

Connecticut can play a leadership role in promoting new practices that will reduce waste locally and nationwide. Large corporate office complexes and government may present a great opportunity to undertake waste reduction activities. For example, they can shift to electronic record keeping (eliminating or reducing paper records), and reduce the amount of paper used in interoffice communications, in documents mailed to customers and clients, and in unsolicited mail advertising. Businesses and manufacturers can reduce the amount of transport packaging waste including increased packaging waste resulting from the growth of on-line purchasing. These entities can also help to educate their customers and supply chain about source reduction opportunities.

The construction industry, including architects and product suppliers, play a very important role since they can influence not only the waste associated with the

construction process, but the built environment in which we live and work every day. This industry can adopt green building practices to achieve substantial source reduction results. For example, they can use non-toxic carpets and solvents in construction and implement other purchasing policies to reduce waste and toxicity. Incorporating the U.S. Green Building Council's Leadership in Environmental Energy Design ("LEED") and other widely accepted standards for green building practices can substantially help reduce construction waste.

- **Change manufacturer practices to produce consumer electronic products using less toxic substances in this country to mirror the changes being made in the products they sell to European countries.**

The computer and consumer electronics industries currently use a number of toxic or hazardous materials in their products, including mercury, lead and chromium. Many original equipment manufacturers are taking steps to phase out these materials, in large part in response to European legislation requiring the elimination of toxic materials. In the U.S., California has adopted legislation requiring consumer electronics to adhere to the European regulations on hazardous substances. The U.S. EPA recently supported the development of the Electronic Product Environmental Assessment Tool ("EPEAT"), a procurement tool to help large purchasers in the public and private sectors evaluate, compare and select electronic products such as computers and monitors based on their environmental attributes. EPEAT also helps manufacturers promote environmentally preferable products.

- **For all Connecticut waste generators, promote source reduction through product stewardship, education and other strategies described in this State Solid Waste Management Plan.**

In addition to the specific priorities listed above, all Connecticut businesses, government agencies, schools, and non-profit organizations have opportunities to reduce waste and toxicity.

Strategies to Reduce the Amount and Toxicity of Solid Waste Generated

Strategy 1-1. Continue to implement the Department's Pollution Prevention Plan which establishes goals and identifies strategies to reduce the quantity and toxicity of wastes discharged to the land, air, and waters of the State.

In 1996, the CT DEP published the Pollution Prevention Plan for Connecticut, a document designed to guide the Department in its efforts to prevent pollution statewide. Preventing pollution requires a shift in how businesses operate, how consumers go about their daily activities, and how institutions are run. The Plan emphasized education and outreach to create an awareness of pollution prevention (P2) opportunities for all sectors of the community (consumers, businesses, and institutions) to form partnerships and invite voluntary participation. In 1999, the CT DEP evaluated the success of the Plan's implementation strategies and it was determined that good progress had been made and efforts needed to continue. More recently, the Department has identified new challenges and is now addressing such

issues as climate change, sprawl, and the use of green building techniques and renewable energy. These issues all involve, at least in part, consideration of how we can create less waste, either through utilizing existing infrastructure when expanding our economy, building structures that last longer or can be recycled, and beneficially using waste materials instead of other fuels to generate power. The Department continues to employ prevention as a way to reduce the amount and toxicity of the waste Connecticut generates and to make Connecticut's environment better and safer as we deal with these challenges.

Strategy 1-2. Educate consumers and businesses about the effects of their purchasing choices and behaviors on waste generation and provide education and incentives to help change purchasing and behavioral practices to reduce the amount and toxicity of waste produced.

There is little to no transparency regarding the true environmental and human costs associated with the products and services we purchase and use, and the resulting waste we dispose. Education is the first step in encouraging change. The CT DEP in partnership with environmental and civic organizations will implement a program to educate consumers and businesses about the environmental and human costs associated with purchasing choices. But awareness alone will not necessarily effectuate change, and product choices and incentives will need to be available as well. The CT DEP will continue to promote EPA's WasteWise program in Connecticut and will expand current pollution prevention outreach to provide information regarding sources for environmentally preferable products and behavior changes that will reduce the amount and toxicity of the waste generated. The CT DEP will work with the standing Agency Solid Waste Management Plan Advisory Committee (the "Committee") and with the business and industry sectors and institutions to decrease their waste disposal rates through increased source reduction by promoting such programs such as re-usable substitutes for non-recyclable/non-reusable transport packaging, including the increased packaging generated by the growth in on-line purchasing.

Strategy 1-3. Continue to support regional and national efforts to change manufacturer practices to produce products that generate less waste and less toxic waste.

CT DEP will promote, support, and disseminate information about efforts to change how we manufacture and use products through the promotion of best practices where energy and material use is optimized, and wastes and pollution are minimized.

Strategy 1-4. Continue to promote environmentally preferable purchasing ("EPP") standards in state and local government; encourage state agencies and municipalities to become members of EPA's WasteWise program; support green design standards; and encourage adoption of the standards by Connecticut local governments and institutions.

Environmentally preferable purchasing involves using criteria related to source reduction, recycling and other environmental concerns to guide purchasing decisions.

The CT DEP will continue to provide support to the CT DAS to promote the purchase of environmentally preferable products by State agencies and municipalities. Pursuant to Governor Rell's Executive Order No. 14, the CT DEP will work with DAS and other State Agencies to establish and write standards and guidelines to provide direction to all State agencies regarding the procuring and use, whenever practicable, of cleaning and/or sanitizing products having properties that minimize potential impacts to human health and the environment, consistent with maintaining clean and sanitary State facilities. The CT DEP will also promote EPA's WasteWise program to State agencies and municipalities. The CT DEP recognizes that there are many opportunities in building renovation and construction where source reduction and re-use can occur. The CT DEP will assist the State of Connecticut's Office of Policy and Management ("OPM") in adopting building construction standards that are consistent with or exceed the silver building rating of the LEED rating system for new commercial construction and major renovation projects, as established by the United States Green Building Council, or an equivalent standard, including, but not limited to, a two-globe rating in the Green Globes USA design program, as required by section 70 of Public Act 06-187.

Strategy 1-5. Provide funding to promote reuse and publicize product reuse opportunities.

Product reuse is a method of reducing the amount of waste generated and has potential to be revitalized and expanded in Connecticut. The CT DEP will sponsor and build partnerships that can include state and local governments, regional waste authorities, the private sector and community groups to support reuse opportunities. Some examples of reuse opportunities include:

- Support existing material waste exchanges, such as the Southern New England Waste Exchange, and building material reuse centers, such as the Bridgeport Connecticut Habitat for Humanity ReStore and the ReCONNstruction Center located in New Britain, by disseminating information promoting their use and seeking funding to help support their development; and
- Dissemination of information promoting reuse and repair operations.

Strategy 1-6. Promote through such activities as technical assistance, start-up funding, and/or other incentives, the implementation of effective PAYT pricing systems by municipalities and haulers for managing solid waste from residents and small businesses to achieve waste reduction.

The CT DEP should develop and adopt strong incentives for local governments to adopt PAYT pricing systems. Endorsement and promotion by Connecticut's municipal groups of PAYT would greatly assist in the acceptance and establishment of this type of waste management program for local implementation. PAYT, when implemented with good education and associated source reduction and recycling programs, has been documented repeatedly to be an effective incentive for waste reduction. National studies indicate that when PAYT is implemented residential waste disposal drops an average of 17 percent. Some of the disposal decrease is achieved through increased

recycling and better home composting and grasscycling, as well as source reduction efforts. It is not easy to convince residents that PAYT really is the most effective and equitable way to pay for solid waste management, making it a politically difficult decision for town officials. However, studies have shown that once a PAYT program is established, most residents embrace and support it.

Strategy 1-7. Secure partnerships, provide funding and coordinate a model source- reduction program to reduce the amount and toxicity of solid waste generated in at least one Connecticut community.

The CT DEP proposes that a model source reduction program be developed and implemented for the purpose of demonstrating the scope of what is possible, incorporating source-reduction strategies and other related strategies identified in this State Solid Waste Management Plan. Some of the strategies that could be implemented in such a model community could include: (1) reducing the amount of junk mail received by residents; (2) encouraging purchase of products with reduced packaging and/or with reduced toxicity, durable products in lieu of disposable, single use products; (3) encouraging reuse through a town swap program and education about material exchanges; (4) promoting sustainable and organic landscaping design and maintenance which can result in waste reduction; and (5) promote source reduction practices such as two-sided copying and paperless offices in businesses. The model can demonstrate how programs can be tailored to Connecticut's unique conditions and chart a course for other communities to achieve this Plan's goals. The CT DEP will work towards securing resources, enlisting partners and selecting the model community, and then work closely with local and regional government agencies, private industry, trade associations, universities, NGOs and others to implement similar programs and document the waste reduced, the environmental benefits achieved, and the money saved.

Strategy 1-8. Continue to enforce Connecticut's Toxics in Packaging Act and other toxic reduction programs and efforts. Continue to work in conjunction with the Toxics in Packaging Clearing House and other member states to assess compliance rates with toxics in packaging laws.

The CT DEP will continue its efforts to ensure compliance with Connecticut's Toxics in Packaging Act and will continue to actively participate in the Toxics in Packaging Clearing House.

4.3.2 Objective 2. Recycling And Composting

Move aggressively to strengthen Connecticut's public and private recycling and composting efforts and infrastructure to increase the quantity and quality of recovered materials and to build resilient, highly efficient and continually improving programs to reduce the amount of solid waste Connecticut disposes, both now and in the future. Therefore Connecticut needs to maximize recycling and composting for all types of solid waste generated in the State. Throughout the Plan composting efforts refer only to the composting of source separated organic material.

Overview – Recycling and Composting

While source reduction is higher on the integrated waste management hierarchy, recycling and composting have the greatest potential to move Connecticut toward its vision of reducing the amount of waste it disposes and treating the waste that it generates as a resource. In some high performing communities nationwide, recycling and composting are responsible for diverting upwards of 70 percent of the waste stream from disposal. This section deals mainly with recycling and composting of MSW. The Plan includes other objectives that discuss recycling and composting for C&D waste; land clearing debris; oversized MSW; electronics; and other solid wastes.

The benefits of recycling and composting are not limited to reducing the amount of solid waste requiring disposal. Moreover, recycling and composting activities: provide an environmentally preferable raw material to manufacturing enterprises, reducing the need for natural resource extraction and thereby conserving precious resources and habitat; provide raw material that is far more efficiently collected and processed saving energy and reducing green house gas emissions and reducing the emission of pollutants to our air, land, and water; can reduce waste disposal costs; and represent a significant force in the U.S. economy.

The State has made great strides in recycling, and the amount of MSW recycled has been increasing steadily since recycling became mandatory in Connecticut in 1991. It is estimated that Connecticut currently recycles 1.124 million tons or 30 percent of the MSW generated (based on FY2003 reported data and estimates of unreported recycling, both projected to FY2005). Although an MSW recycling rate of 30 percent is consistent with the 2001 national average, it is far short of the State's 2000 statutory source reduction/recycling goal of 40 percent. Unfortunately, over the years the percentage of MSW recycled remains steady even though the amount of waste generated grows, resulting in increasing amounts of MSW disposed. The failure of Connecticut to achieve its recycling/source reduction rate can be partly attributed to the lack of resources available to: sustain and increase recycling participation rates; increase source reduction efforts; assess Connecticut's mature recycling program and amend it as necessary to make it more effective; and take advantage of changing technologies, changing waste streams, changing market conditions, and untapped recycling/potential for some components of Connecticut's waste stream.

This Plan calls for renewed, reinvigorated, and expanded efforts at recycling and composting. These efforts must be undertaken so that, at a minimum, by FY2024, Connecticut, will hold steady the FY2005 amount of Connecticut MSW requiring disposal (i.e., approximately 2,681,000 tons). This requires Connecticut to meet the difficult challenge of diverting 2,553,000 tons of MSW from disposal by FY2024, achieving a 49 percent MSW recycling/composting rate. To completely eliminate the in-state disposal capacity shortfall projected for FY2024 – Connecticut would need to divert 3,167,000 tons from disposal that would mean achieving the extremely aggressive MSW recycling/source reduction rate of 61 percent.

The implementation of new programs to divert more food scraps from the waste disposal stream will be a major strategy in helping to achieve that goal. According to

the US EPA MSW characterization for 2003, food scraps account for close to 12 percent of the MSW generated in this country Connecticut is currently recovering only a miniscule part of that waste stream. Waste disposal characterization studies in other states have indicated similar situations. Pennsylvania's Waste Disposal Characterization Study revealed that food waste was 12 percent of the MSW disposed. The potential to decrease waste disposal in Connecticut by increasing food waste recovery is substantial.

Current Recycling and Composting Practices

This section provides a synopsis of Connecticut's recycling and composting practices. A more detailed summary is provided in Appendix D.

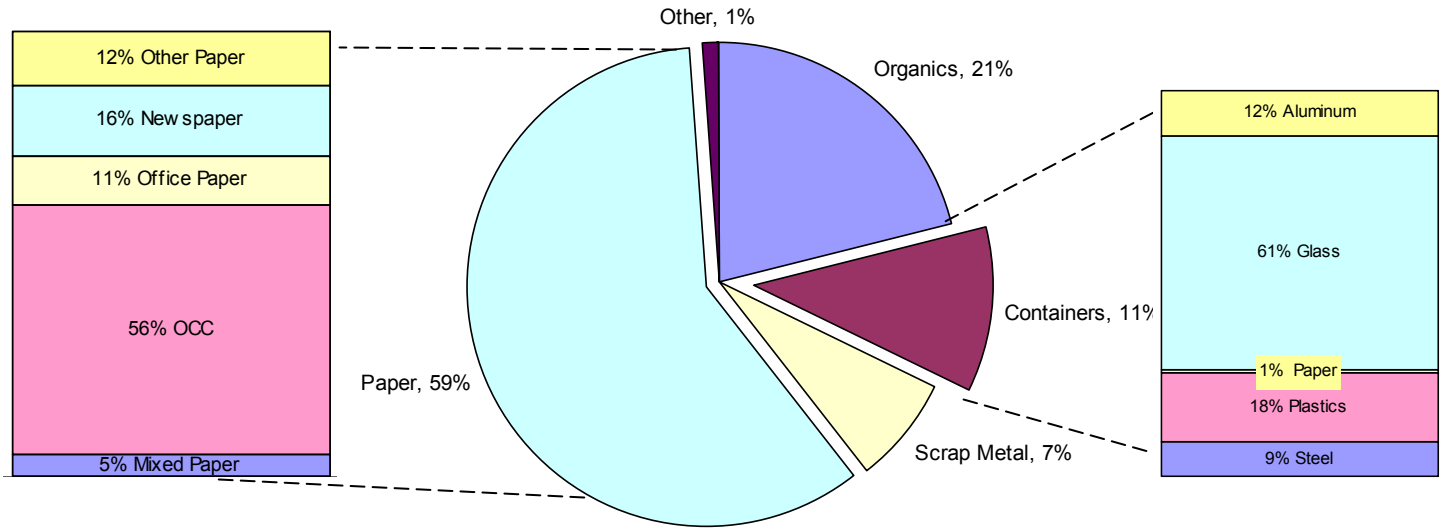
Connecticut has a mature recycling program in place. This program was developed in response to recycling mandates (most of which became effective in 1991) accompanied by comprehensive programs for recycling education and recycling technical assistance and outreach. State funding was awarded to the municipalities and recycling regions for the development of the State's recycling infrastructure and for recycling education; in the 1990s, the State awarded nearly $40 million in grants to municipalities to support the State's recycling program. As a result of this significant investment of time, money, and effort, approximately 30 percent of Connecticut's MSW is estimated recycled or composted.

Figure 4-1 provides a breakdown of the MSW materials recycled and composted in Connecticut in FY2003. As shown in the figure, the greatest percentage of reported materials consists of paper (cardboard, newspaper, mixed paper, office paper, and other types of paper), followed by organics (leaves, yard waste), scrap metal, containers (glass, plastic, steel, paper, and aluminum), and a small amount of other items (e.g. waste oil, textiles, antifreeze, computers, etc.)

The recycling funding which was awarded in the 1990s to kick-start the regional and municipal recycling programs is now exhausted. Connecticut now finds itself with a largely stagnant recycling and composting rate (percent MSW recycled) which suffers from a chronic lack of resources and which has some critical gaps in service and infrastructure. This has resulted in a recycling rate stalled at approximately 1997 levels.

Connecticut recycling processing capacity for the current mandated recyclables appears to be sufficient for the near term. However, there will be additional capacity needed for some of the materials targeted by this Plan for increased recycling such as commercial and institutional source separated organic matter, electronics, and recyclables recovered from C&D waste. A comprehensive waste characterization study of disposal would help to document the future need for additional recycling processing capacity, as Connecticut makes progress toward meeting its waste diversion objectives.

Figure 4-1
Estimates of Connecticut MSW Diverted from Disposal (FY2003)



Source: Solid Waste and Recycling Reports Submitted to CT DEP and estimated by R. W. Beck from CRRA reports.

Recycling/Composting Mandates

Connecticut State Recycling Law requires separation of state mandated recyclables by everyone who generates them (including residents, businesses, institutions, and government); prohibits haulers from knowingly mixing the mandated recyclables with other solid waste; and requires municipalities to make provision for separation, collection, processing and marketing of designated recyclables. The State designated list of recyclables includes:

- corrugated cardboard;
- glass food containers;
- metal food containers;
- newspaper;
- high grade white office paper (non-residential only);
- scrap metal;
- lead-acid storage batteries (also has a deposit system and disposal ban);
- crankcase waste oil from engines;
- Ni-Cd rechargeable batteries;
- leaves; and

- grass clippings (disposal ban).

Many regional and municipal programs recycle additional materials such as mixed paper generated by residents; magazines; PET (#1) and HDPE (#2) plastic bottles; and yard waste. There is a bottle bill law in Connecticut that recovers additional beverage containers from the waste stream.

The proper enforcement of these laws is a joint effort shared by municipalities, haulers, disposal facilities and the CT DEP. The following are examples of some mandated recycling responsibilities:

- **Municipalities**

  Responsibility for solid waste management has historically been a function of municipalities. Since the early 1970s, municipalities have been required to make provision for the safe and sanitary disposal of all solid wastes generated within their borders (CGS Section 22a-220). In the mid-1980s, legislation was passed which required each municipality to make provisions (on or after January 1, 1991) for the separation, collection, processing, and marketing of designated recyclables generated within their boundaries (CGS Section 22a-220(f)). Subsections of CGS Section 22a-220 also mandate a goal for municipalities to recycle and/or source reduce their waste by 40 percent and required municipalities to adopt a recycling ordinance, designate a municipal recycling contact, and submit an annual recycling report to CT DEP, and authorize CT DEP to issue orders against municipalities not in compliance with these requirements. Municipalities have statutory authority to establish fines for violations of their recycling ordinance.

- **Generators**

  All generators of solid waste, including residents, businesses, institutions, and government are required to separate or provide for separation of designated recyclables. Designated recyclables are required to be recycled by regulations adopted under Section 22a-241b. There are no facilities in Connecticut that are permitted to separate designated recyclables from mixed MSW; designated recyclables cannot be collected mixed with MSW or with any other material that may contaminate them.

- **Haulers**

  Examples of mandated recycling requirements for haulers include: (1) requirement to register in the municipalities in which they operate; (2) requirement to help municipalities enforce the municipal recycling ordinance (i.e. collectors are required to notify the municipal recycling contact about any customer believed to be discarding designated recyclables with solid waste. Upon request of the municipality, a hauler is required to provide a warning notice to customers suspected of violating separation requirements. Haulers shall also assist the municipality in identifying persons responsible for creating solid waste loads containing significant amounts of recyclables which were detected by the receiving resource recovery or solid waste facility); and (3) a prohibition against knowingly mixing solid waste with separated recyclables. Haulers are subject to a

civil penalty up to $2,500 for each violation and up to $10,000 for a subsequent violation of this prohibition.

- **Solid Waste Facilities**

  CGS Section 22a-220c(b) requires the owner or operator of each resources recovery facility or other solid waste facility (meaning other disposal facilities or other solid waste facilities which transfer solid waste to disposal facilities) who observes significant quantities of designated recyclables in the loads received at their facility to provide prompt notification to the driver of the vehicle delivering the load and to the recycling contact of the municipality from which the load originated. The owner or operator of each such facility is also required to conduct periodic unannounced inspections of loads delivered to the resources recovery facility or solid waste facility to assist municipalities and the commissioner in accurately assessing compliance with recycling requirements. Such owners or operators are also required to conduct additional inspections upon the request of the commissioner. Facility owners or operators of resource recovery facilities and landfills who fail to comply with these requirements are subject to civil penalties of $500 to $5,000 for each occurrence of a violation.

  In actual practice, the system of recycling enforcement has been problematic:

  - Many municipalities are not enforcing their recycling ordinance;
  - The CT DEP doesn't have adequate staff resources or civil penalty authorization specific to some types of recycling violations;
  - Many haulers are not enforcing or promoting recycling and some are mixing separated recyclables with trash; and
  - Some solid waste disposal or transfer facility owners or operators are not inspecting loads for significant amounts of recyclables and even for those that are conducting the inspections, many are not effectively following-up on such loads to assure that the problem is being followed up and corrected by the municipality or the generator.

Recycling/Composting Outreach Programs

Making everyone aware of his or her role in recycling is critical for the system to function at its optimum. What can and should be recycled and how to do so requires outreach that delivers consistent, repetitive messages that are audience appropriate. Focusing on our youth pays off both in the present (as they teach their parents) and the future. Recycling outreach programs implemented in Connecticut since 1991 include:

- Connecticut Business Environmental Council ("CBEC"): Originally called the Connecticut Business Recycling Council, it consisted of businesses helping other businesses set-up recycling programs. The Council's start-up and first few years of operation were funded by CT DEP. *Status*: CBEC still exists, but no longer receives CT DEP funding. Although not as active as in earlier years, CBEC is currently contracted by the Tunxis Recycling Operating Committee ("TROC") to follow-up with businesses that send loads with significant amount of recyclables to

the Bristol Resource Recovery Facility for disposal to help those businesses set-up effective recycling programs.

- Recycling conferences, workshops, presentations, videos, fact sheets, table top exhibits, poster contests, and manuals for businesses, schools, municipalities, institutions, hospitals, colleges and universities, state agencies, etc. *Status*: Direct outreach curtailed; materials still exist but are dated.
- America Recycles Day activities. *Status*: CT DEP efforts greatly curtailed, Connecticut Recyclers Coalition ("CRC") has taken on some of the responsibilities of the Program.
- Recycling Education Centers located at the Groton, Hartford, and Stratford Intermediate Processing Facilities ("IPCs") - highly effective in teaching students and teachers about source reduction and recycling. *Status*: On-going.
- Ray Cycle: Recycling superhero program for schools. *Status*: discontinued.
- Statewide multi-media campaign ($600,000 value) - radio, television, printed materials, bus billboards. *Status*: One time effort at start up of the State recycling program in 1990s.

Recycling Collection and Processing

Most homes and businesses have access to recycling services, and the recycling collection and processing infrastructure is in place for mandated recyclable materials. However, currently there is very little recycling outreach, education, technical assistance, or enforcement.

Collected recyclables flow either directly from the point of generation or through transfer stations, to destinations in Connecticut or out-of-state for processing and recycling. Destinations include recycling processing facilities, scrap metal dealers, composting sites, waste oil processing facilities, and end users such as paper mills. Depending on the type, amount, and/or number of waste materials being aggregated or processed a Connecticut solid waste management/recycling facility may either have a general permit, an individual permit, or be a registered facility. Recycling general permits were developed to be less burdensome and to simplify and facilitate the permitting process for recycling facilities that handle a relatively small amount of waste or only one material.

Some items such as some bottle bill bottles and cans, some types of batteries, and telephone directories have material specific infrastructures in place for recycling which are administered by industry groups. For example:

- It is estimated that close to 67 percent of Connecticut's carbonated beverage containers are collected through Connecticut's bottle bill infrastructure and assumed to be recycled. However there are no reporting requirements associated with Connecticut's bottle bill.
- Close to 98 percent (based on national numbers) of lead acid storage batteries are recycled through a separate deposit program for these batteries.

- Rechargeable batteries (nickel-cadmium-NiCd; nickel metal hydride-NiMH; lithium ion-Li-ion; and small sealed lead-Pb) are recycled through retailers and municipal drop-off sites through a national recycling program operated and financed by the battery industry through the Rechargeable Battery Recycling Corporation ("RBRC") Call2Recycle™ Program.
- Telephone directory publishers distributing their directories in Connecticut are required to retrieve a percentage of their directories for recycling.

In the early 1990s, a system of nine regional recycling districts was formed to undertake recycling education and assist municipalities with contracting and marketing materials. Some of the State recycling grant money was awarded to the regions to develop regional recycling intermediate processing facilities (IPCs) to process paper, bottles and cans from member towns. Currently, some of those IPCs accept only residentially generated recyclables, while others accept both residential and non-residential material. Several of the recycling regions, with authority to enter into contracts on behalf of their member municipalities, executed long-term contracts for recycling with the IPCs on behalf of the towns. In many cases, the tipping fees for recyclables at the IPCs are approximately half of tipping fees for trash delivered to the resource recovery facilities ("RRFs"), though one IPC does provide for revenue sharing. A unique system to promote recycling by member towns was implemented by the Connecticut Resource Recovery Authority ("CRRA") at its Hartford IPC and MidCT RRF and at the Stratford IPC and Bridgeport RRF. The tipping fee paid for trash delivered to the MidCT RRF and Bridgeport RRF by member towns also covers the costs of processing residential recyclables (bottles, cans, and paper) at the Hartford IPC and Stratford IPC (and for other recycling services such as one-day electronics collection days). This allows for no tip fee for residential recyclables delivered by member towns to the Hartford and Stratford IPCs. This system provides a strong incentive for member towns to reduce the amount of trash they dispose and increase the amount of material they recycle.

Though some of the regional recycling districts are currently inactive or have reduced their recycling involvement, some are still actively working to promote recycling. The following are some examples of *new* programs recently announced: In August 2005, CRRA announced a partnership to expand the CRRA Hartford IPC. The expansion of the facility will greatly increasing the types of materials that will be recycled and the capacity and efficiency of the operation and will provide a tonnage payment to CRRA, plus a revenue-sharing arrangement. In 2006, the Tunxis Recycling Operating Committee ("TROC") completed a market research study that identified factors influencing recycling among its residents and identified areas where key improvements need to be made to increase recycling participation. In the spring of 2006, HRRA announced the expansion and improvement of their website and recycling assistance for member towns. The Southeastern Connecticut Regional Resource Recovery Authority ("SCRRRA") recently announced that all member town transfer stations accept electronics for recycling from residents and announced a regional composting bin distribution program. These examples demonstrate the potential of the regional recycling system in Connecticut to provide the foundation for enhancing regional cooperation to support and promote recycling.

Practically speaking, all residents have access to either curbside or drop-off recycling services, and in many instances it is provided through the municipality. Although commercial recycling services are generally handled by the private sector, some municipalities provide for recycling pick-up and/or provide options for drop-off of recyclables for the businesses located in their city or town. Due to economies of scale larger businesses tend to have recycling programs in place and depending on the type of business, some recycle material in addition to those mandated by state law (if quantities and markets for those additional materials make it economically feasible). However, in general, there is a lack of programs that efficiently and cost effectively collect recyclables from small businesses. The reasons for this are varied, but small business recycling programs generally do not realize the benefits of economies of scale of the large business recycling programs. This the lack of economic incentives for small businesses to recycle under the current trash hauling infrastructure coupled with inadequate enforcement of recycling requirements has resulted in limited recycling participation by small businesses. This problem is universal and is not limited to Connecticut.

Current Organics Recycling/Composting Practices

Composting in Connecticut spans a variety of feedstocks, but the most prevalent organic material currently being composted are leaves. As of March 2006, ninety-four leaf composting facilities were registered with the CT DEP. Twenty-one of these are privately owned and/or operated; the rest are municipally operated. Thirteen of those are currently inactive. Combined, the active sites have a processing capacity of approximately 666,000 cubic yards of leaves per year. Residents, landscapers, and municipal public works and highway departments use compost produced by these facilities as a soil amendment or mulch. The Connecticut Department of Transportation ("CT DOT") has used compost on highway projects and in wetland creation.

Farms can play an integral part in the State's composting effort. Another option available for recycling leaves generated by municipalities is sheet leaf composting, the application and incorporation of leaves on cropland actively devoted to agricultural production. In 2005, four farms notified the CT DEP that they planned to accept leaves for sheet leaf composting, with a combined capacity to compost approximately 16,440 cubic yards of leaves. In addition, 26 farms (4 inactive) have agricultural waste management plans approved by the CT DEP for composting such materials as horse manure, animal bedding, leaves, soiled non-recyclable paper, vegetable waste, hay, slaughterhouse waste, fish mortalities, and dead poultry. Combined, the active farm sites have the capacity to process approximately 33,478 cubic yards per year of organic material.

In Connecticut, in addition to municipal leaf composting facilities and farm-based composting, there are a small number of institutional food scrap composting efforts underway. The CT Department of Corrections ("CT DOC") Prison Complex in Enfield has composted food scraps from the prison sculleries for 9 years at a rate of 2000 pounds per day. Working cooperatively, the CT DOT provides wood chips as a bulking agent in exchange for the use of adjacent CT DOC property as a staging area

for wood cleared during highway maintenance. This program results in a 50 percent savings on dumpster costs, creates a compost product used on prison grounds and provides jobs and job training for soon to be released inmates.

At a local level, there are several elementary schools that have cafeteria food scrap composting bins on school grounds. Southeast Elementary School in the Town of Mansfield, CT was the model used in the development of the School Composting Manual funded by the CT DEP; information is available on the CT DEP website. Some colleges and universities compost manures, yard trimmings, and/or food scraps on-site. Unique composting efforts are being pursued by others: Foodshare, grinds spoiled produce into slurry and delivers it to an organic farm for composting; and the City of Middletown, is establishing a vermi-composting (worm composting) project for local commercial and institutional generators. Others in this category include one-day zero waste events where food scraps and bio-based dishware is composted with leaves, animal mortality composting on farms, and the CT DEP's own on-site office food scrap composting program.

The permitting of composting activities varies depending on the type of feedstock, volume, location, and processing technology. Facilities composting only leaves are exempted from solid waste permitting provided they register with the CT DEP. Sheet leaf composting on agricultural land is also exempt and practitioners need only notify the CT DEP. The addition of grass clippings to leaf sites can be approved through the issuance of a general permit registration. On-site composting of source separated organics, such as institutional, school, or home composting, is not regulated as long as the processing capacity falls under one ton/hour pursuant to CGS Section 22a-207(5). On-farm composting is allowed under the agricultural waste management plans approved by the CT DEP. The CT DEP through the NPDES permit process regulates sewage sludge (a.k.a. biosolids) composting at two publicly owned wastewater treatment facilities currently operating sludge compost facilities, one in Farmington and the other in Fairfield. Source separated organics recycling facilities taking materials from many different off-site sources at a rate greater than one ton/hour are required to obtain a solid waste volume reduction facility individual permit. Depending on the circumstances, water discharge or storm water management permits may be required at any facility.

Technologies for mixed MSW composting involve collecting mixed municipal solid waste from which recyclables have not been source separated, processing the waste to remove some recyclables and unwanted inorganic materials, and composting the remaining waste. The Department has determined that mixed MSW composting, using current technologies, is not an acceptable means of solid waste management for Connecticut because of concerns about facility operations, odors, and the quality and marketability of the compost product. Accordingly, in 1996, the General Assembly amended CGS Section 22a-228(b) to eliminate composting of mixed MSW from the solid waste management hierarchy. In all permitting and technical assistance efforts, the Department has required that composting facilities accept only source separated organic materials that will result in a high quality compost.

Current Efforts to Support Recycling/Composting Markets

Recycling programs can only succeed when the material collected for recycling is used to make products which are competitive in quality and price and which have market demand. Demand for recycled materials is enhanced when government encourages or requires the use of recycled material in products that meet high quality standards. Actions taken in Connecticut to increase demand for recycled materials include:

- A statutory requirement for newsprint users to collectively use a minimum percentage of recycled newsprint fiber (CGS Sections 22a-256m through 22a-256u). This requirement and similar efforts in other states resulted in expanded North American mill capacity to de-ink and use recycled newsprint.
- A statutory requirement for directory publishers to use a minimum percentage of recycled content directory paper.
- Promotion of EPP by state agencies and municipalities through the CT DAS. EPP involves using criteria related to source reduction, recycling and other environmental concerns to guide purchasing decisions. A series of state statutes have been adopted to facilitate and increase the purchase of recycled content products by Connecticut State agencies and municipalities. These include (but are not limited to):
    - CGS Section 4a-59 (c): Award of contracts (allows 10 percent price preference for recycled content products).
    - CGS Section 4a-67a: Plan to increase State purchase of goods containing recyclable materials and goods capable of being recycled or remanufactured.
    - CGS Section 4a-67e: Standards for purchase of recycled paper.
    - CGS Section 4a-67f : Specifications for printing and writing paper (minimum 30 percent post-consumer content).
    - CGS Section 4a-67g: Recycling and remanufacturing of laser printer toner cartridges.
    - CGS Section 4a-67h: Procedures promoting the procurement and use of recycled products and environmentally preferable products and services by state agencies.
- The regional promotion of market development through support of work with organizations such as the Northeast Recycling Council ("NERC"). The CT DEP has worked with the Northeast Recycling Council on a range of market development efforts at the regional level. Some examples include: working with the Direct Marketing Association to reduce the waste associated with direct mail by increasing the use of recycled materials, as well as source reduction and design for recyclability; working with northeast newspaper publishers to increase their use of recycled content newsprint in the region; working with directory publishers to make their directories more recyclable (i.e. glues, paper, etc.) and to use

recycled paper; in the late 1990's NERC helped develop the Recycling Investment Forum ("RIF") as a strategy to stimulate the development of businesses processing or manufacturing products from recycled materials.

- CT DEP has conducted workshops, presentations and other outreach efforts to encourage state agencies, municipalities, businesses and others to boost purchases of recycled content products.
- The CT DEP includes buy-recycled messages in most recycling outreach materials.
- The Town of Glastonbury was able to produce a better quality compost from the leaves they compost at their municipal composting site and starting in May 2006 were able to charge $8 a cubic yard for the higher-quality compost rather than give it away for free.
- CT DEP collaborated on a research project with CT DOT and the Connecticut Transportation Institute ("CTI") at the University of Connecticut ("UCONN"), which demonstrated that compost was effective in controlling soil erosion, growing turf, and amending soil used in planting roadside trees and shrubs. As a result of the research, CT DOT now has a materials specification and a construction detail that allows the substitution of compost for peat in planting backfill.

Barriers to Increasing Recycling and Composting

The following are the key barriers that hamper growth in recycling/composting in Connecticut:

- A chronic lack of ongoing funding at the local, regional and State levels. The level of funding, staffing and other resources allocated to recycling and composting has not been adequately maintained. Connecticut municipalities and regional recycling operating committees are chronically strapped for resources and staffing, and this has severely hampered progress in waste diversion. At the State level, CT DEP recycling funding is far below the level in the past and far below the level in many other states that are seeking to achieve aggressive waste diversion targets. The current level of CT DEP staffing dedicated to recycling issues is insufficient to maintain existing recycling programs let alone achieve the higher rate of diversion called for in this plan.
- Failure to fulfill assigned or mandated recycling/composting responsibility by some municipalities, haulers, and solid waste facility owners/operators.
- Failure of municipalities and the state to enforce recycling requirements.
- While the State has an aggressive program to collect and analyze data to calculate statewide and individual municipal MSW disposal, recycling, and generation rates, the reported data is not always complete or accurate especially for individual municipalities. In addition, there are no resources to collect or use data to assess the need or success of specific programs.

- Low public awareness and concern over waste management and recycling and no incentives to reduce waste generated and disposed resulting in low recycling participation rates in some municipalities:
    - Education and outreach resources to support Connecticut's recycling and composting programs have been very limited. Ongoing education and outreach have been proven to be necessary elements, over time, to sustain high participation rates.
    - Connecticut's current recycling programs and policies provide no mechanisms to drive continual program improvement and expansion. There are few drivers that cause public and private decision makers to: (1) actively promote and achieve meaningful source reduction and recycling; (2) continually assess current approaches and innovate new approaches; and (3) force compliance with mandated recycling responsibilities.
    - Lack of incentives for waste generators, haulers and manufacturers to support greater recycling.
- A permitting process widely perceived among private-sector firms as inhibiting the development of certain recycling or composting facilities due to overly costly, lengthy and uncertain procedures. During the Stakeholder process, comments were received that Connecticut's permitting policies have inhibited the development of certain critical facilities such as food waste composting, C&D waste recycling, electronics recycling and some beneficial uses of waste.
- The current system for enforcing recycling mandates is largely ineffective.
- Issues directly affecting the viability of markets for some material currently collected for recycling include the following: concerns over the declining quality of some material collected for recycling; a lack of market demand for some materials (affecting the economics of collecting and processing this material); insufficient recyclables collected to meet market demand (affecting the viability of both the recycling processors and the manufacturers that depend on those recycled materials as a feedstock); and continually changing packaging designs (such as the increasing use of radio frequency identification devices ("RFIDs") for tracking and inventory control in all types of products and packaging), some of which may pose problems for current recycling systems. Specific examples of some of the market issues negatively impacting recycling include:
    - Current (2005) poor to non-existent domestic container markets and limited other markets for green glass;
    - Current (2005) market demand for some plastic resins and paper which exceeds the amount of these materials collected and processed for recycling;
    - For example: market demand for plastic (PET and HDPE) exceeds the amount collected and a higher percentage of this material is being exported, creating significant concerns over the sustainability of domestic markets for this material;

  - When changing packaging designs, manufacturers, do not always take recyclability into account and, as a result, some new packaging designs may potentially pose problems for existing recycling systems.
  - For example: layers and barrier coats, adhesives, labels, closures, etc. added to plastic bottles can impact the recyclability of the bottle; the rapid introduction and use of RFID's on all types of products and packaging may potentially impact the recyclability of the packaging.

- Lack of incentives for recycling businesses or processors to locate in Connecticut. Recycling processors and manufacturers have varying financing needs, depending on their product, their market and their particular strengths and weaknesses. Financing can be the key to allowing companies with challenging needs to grow, such as those with new, unproven products or those entering newly emerging markets for which traditional investors may have strong reservations due to perceived risk. However, there is a lack of programs specifically designed to help recycling businesses and end users to site or expand new facilities. CGS Section 32-1e was modified by Public Act 06-27 to require the Connecticut Department of Economic and Community Development (DECD) in consultation with the CRRA and the CT DEP to develop a plan by July 1, 2007 for the support and promotion of industries that use, process, or transport recycled materials. The plan is required to outline ways existing programs of the DECD, the CRRA, and agencies such as the CT DEP, the Connecticut Development Authority and Connecticut Innovations, Incorporated will be used to promote such industries.
- Lack of program models that can be implemented in Connecticut to efficiently and cost effectively collect recyclables from small businesses. Although economies of scale generally make recycling cost effective for large businesses, the same is not true for small businesses and as a result many of Connecticut's small businesses are not recycling. The reasons for limited recycling by small businesses are varied, but the major issues appear to be a lack of economic incentives for small businesses to recycle under the current trash hauling infrastructure and inadequate enforcement of recycling requirements.
- Barriers specific to recycling/composting source separated industrial, commercial, and institutional organics, such as food scraps, soiled paper and waxed corrugated cardboard can include:
  - Difficulty in siting facilities based on local zoning issues and permitting requirements;
  - State regulatory requirements and fees which do not encourage the development of facilities to process those materials; and
  - a lack of knowledge by the generators of organic materials about the opportunities and benefits of composting.

Recycling and Composting Opportunities and Priorities

Through the combined efforts at source reduction, recycling, and composting, Connecticut proposes to take aggressive actions toward achieving a diversion from disposal rate sufficient to eliminate the projected in-state disposal capacity shortfall. That would equate to achieving a 61 percent MSW diversion from disposal rate by FY2024. Recognizing that this would be a very difficult goal to achieve, over the twenty-year planning period of this Plan, the strategies presented in this plan look at a minimum to maintain, through FY2024, the current amount of MSW disposed annually. This goal (maintaining tons of MSW disposed annually through FY2024) still equates to increasing the MSW disposal diversion goals to: 35 percent by FY2010; 40 percent by FY2015; 45 percent by FY2020 and 49 percent by FY2024.

To achieve these ambitious increases in recycling rates, the State needs to implement a variety of strategies to increase the quantity and quality of recovered materials and to build resilient, highly efficient and continually improving programs. The following are Connecticut's priorities for increasing recycling and composting:

- Increase efforts to educate Connecticut's consumers regarding the problems associated with increased waste generation, and the steps that they can take to reduce the amount of waste they generate, reuse materials and products as much as possible, and recycle those waste materials that can't be reused.
- **Provide sufficient funding to municipalities, regional recycling entities, and state agencies to implement the recycling and composting strategies in the Plan.**
- **Establish incentives for generators, municipalities, haulers and manufacturers to divert more MSW from disposal.**

  Incentives such as PAYT waste disposal pricing incorporating free recycling services; hauler contracting terms that provide incentives for decreasing waste disposed; and additional recycling mandates (for economically marketable materials) will motivate all stakeholders to take action to promote source reduction and recycling.
- **Strengthen enforcement of the State's existing mandatory recycling system.**

  Greater, high-profile enforcement efforts can boost participation rates and awareness of solid waste management needs in Connecticut and the State's desire to increase recycling.
- **Streamline the recycling facility permitting process.**

  Facilitating permitting can boost the infrastructure for recycling high-volume and problematic waste streams.
- **Enhance existing municipal programs and demonstrate highly effective Connecticut models.**

  Nationwide, a range of innovative approaches have been proven to effectively boost waste diversion levels substantially. Connecticut needs to identify how these

innovations can best be applied given the unique circumstances present in Connecticut, and then promote these best practices in a variety of ways.

- **Strengthen regional coordination and cooperation.**

  Connecticut needs to strengthen and increase use of regional sharing of information and programs to reduce waste disposal.

- **Provide incentives for recycling processing businesses and businesses using recycled material to locate in Connecticut.**

  Provide assistance to recyclers and end-users and reuse companies to increase value-added beneficial use of recovered materials to help achieve Connecticut's waste diversion objectives.

- **Build capacity for market development services.**

  Given Connecticut's aggressive waste diversion objectives, its lack of critical market infrastructure in at least two areas (food waste and C&D waste) and Connecticut's current modest capacity for providing market development services, Connecticut needs to build capacity to assist processors, end-users and reuse companies to overcome market barriers and increase value-added beneficial use of recovered materials. This means establishing a central program at the State level (whether at the CT DEP, another State agency or an independent organization) and building partnerships among other key organizations that can help achieve this.

- **Increase the recycling and composting of organic wastes especially source separated food residuals generated by the institutional/commercial/industrial sector.**

  There is a tremendous opportunity to grow the organics recycling industry in Connecticut, especially for source separated industrial, commercial, and institutional ("ICI") organics, such as food scraps, soiled paper and waxed corrugated cardboard. As other recyclables are captured, these items become the wettest and heaviest fragment of the waste stream. Removing them is the logical next step and would result in cost avoidance of tip fees, value-added compost products, increased recycling rates, and perhaps better efficiency and improved emissions at the RRFs. It is important that the organics be separated at the point of generation (source separated), and not commingled.

- **Enhance Connecticut's Beverage Container Deposit Law.**

  Connecticut's beverage container deposit law (CGS Section 22a-244) has been in place since 1980, including an infrastructure of redemption/collection centers for deposit containers throughout the State. This law has not been significantly updated in many years and there has been no change in the deposit amount and no change in the types of deposit containers since its inception. The State is committed to this system because it helps prevent litter and prevents material from entering the waste disposal system. This program can be enhanced to increase the recovery rate of beverage containers.

Recycling and Composting Strategies

Connecticut will expand recycling and composting by pursuing strategies listed below as well as pursuing strategies listed in other sections of this Chapter such as: (1) increased public education to maintain and enhance recycling and composting recovery rates; (2) increased recycling enforcement at all points of waste flow through the combined commitment of waste collectors, municipalities, solid waste disposal facilities, and the state; (3) reassessing CT DEP solid waste facility permitting to facilitate the expansion and permitting of solid waste recycling facilities in manner that minimizes contamination of recyclables thereby limiting their marketability; and (4) increased funding for municipal, regional and state efforts to reduce waste disposal tonnages.

Since organics recycling or composting has great potential to decrease disposal rates in Connecticut, a set of strategies specific to achieving increases in the amount of organics composted and recycled is listed separately. The most important strategy to implement successful organics recycling in Connecticut is to build processing capacity for at least an additional 100,000 tons/year of source separated organic materials, especially food scraps, soiled paper and waxed old corrugated cardboard from the industrial, commercial, and institutional sectors. Although it will likely require the siting of some large-scale facilities, this capacity should be achieved through a variety of on-site, farm, municipal and regional facilities. The State, quasi-government agencies, waste generators, organics processors, haulers and residents should share the responsibility for increasing capacity and recycling rates for organics.

Strategies to Increase Recycling

Strategy 2-1. Update Connecticut's beverage container deposit system by increasing the deposit amount and expanding coverage to at least plastic water bottles.

The CT DEP recommends that the beverage container deposit law be changed: (1) to allow for an increase of the deposit amount from 5 cents to 10 cents to provide a stronger price incentive for recovery of deposit containers; (2) to add plastic water bottles to the type of containers that would require a deposit; and (3) to increase, as appropriate, the fee that goes to retailers and redemption centers to cover their handling costs.

Strategy 2-2. Add plastics PET #1 and HDPE #2 and magazines to the list of State mandated recyclables.

Although many of Connecticut's recycling facilities process and market magazines and plastic bottles (PET #1 and HDPE #2) and many towns collect those recyclables and the markets for those recyclables are good, they are not State designated mandatory recyclables. Consequently the potential exists to recover and recycle more of those items in Connecticut.

Plastic containers and plastic products are becoming a larger percent of the waste stream by volume and by weight. EPA estimates that plastic packaging increased from 0.1 percent of the MSW stream (by weight) in 1960 to 5 percent (by weight) in 2003

(plastic packaging includes plastic wraps, containers, and other plastic packaging). The American Plastics Council estimates that 96 percent of all plastic bottles produced are either PET #1 or HDPE #2. Despite the increased amounts of plastic used in packaging and readily available markets for some resins, there is not enough material being recovered to meet the demand for this material by manufacturers who want to use it to make new products. Connecticut needs to do a better job of recovering those plastic resins (PET and HDPE). Although many Connecticut municipalities do collect plastic #1 and/or plastic #2 bottles, many do not. Additionally, very few of these plastic containers are recovered from waste generated away from home. Therefore, the State will add plastic bottles (PET #1 and HDPE #2) to the list of mandatory recyclables.

There are also established markets for magazines recovered from the waste stream and in Connecticut, the infrastructure is in place to collect and process this type of material as well. Again, some Connecticut municipalities are collecting magazines, while others are not. The State will add this item to the list of mandatory recyclables and this will result in an increased recovery rate.

For municipalities not currently collecting these materials for recycling, funding to help pay for changes in the collection infrastructure might be needed if additional costs are incurred as a result of these new mandates (i.e., if savings from removing these materials from the waste disposal collection infrastructure do not cover increased expenses related to collecting these materials for recycling).

Strategy 2-3. Establish environmentally preferable purchasing (EPP) as state policy. Continue to support EPP at CT DAS and promote and ensure state agencies and political subdivision utilization of EPP standards. CT DEP and CT DAS will evaluate the relevant statutes to ensure their completeness and effectiveness in actual State purchasing practices.

EPP involves using criteria related to source reduction, recycling and other environmental concerns to guide purchasing decisions. EPP programs have been adopted by U.S. EPA, as well as Connecticut and several other states and communities. The EPP program at CT DAS needs to be supported and promoted to enhance the effectiveness of the program in ensuring EPP (including recycled content products) by state and local government.

Strategy 2-4. Establish a subcommittee of the Agency's Solid Waste Management Advisory Committee for the purpose of identifying methods to implement PAYT on a voluntary basis. Specifically the subcommittee will identify incentives for municipalities and haulers to implement effective PAYT pricing systems for managing solid waste from residents and small businesses to achieve waste reduction.

PAYT programs (also known as unit pricing or variable-rate pricing) are structured so that residents (and sometimes small businesses as well), are charged for trash collection and disposal based on the amount they throw away. Usually under PAYT residents and participating small businesses are not charged a recycling fee. This creates a direct economic incentive to recycle more and to generate less waste. PAYT when structured effectively and when implemented with good education and associated source reduction and recycling programs, has been documented repeatedly to be an extremely effective incentive for waste reduction. National studies indicate that when PAYT is implemented for the residential sector, waste disposal drops an average of 17 percent. The disposal decrease is achieved through source reduction, increased recycling and better home composting and grasscycling. Since Connecticut already has a recycling mandate, the decrease in disposal may not be as high as that indicated by national studies, but it would still be significant. In Massachusetts (where recycling is mandatory as well), communities with PAYT have an average recycling rate of 44 percent; this is 13 percent higher than the average recycling rate for municipalities without unit-based pricing programs. The decrease in MSW disposal achieved by PAYT could be even higher if small businesses also followed the PAYT paradigm for MSW disposal. In Connecticut some haulers providing automated trash pick-up have offered a form of PAYT by offering different size trash containers at different prices. However, it needs to be determined whether there is sufficient choice of container size and the difference in charges between the different size containers is great enough to provide an incentive to dispose less.

Since PAYT may be perceived as just another tax, it can be a challenge to convince residents that PAYT really is the most effective and equitable way to pay for solid waste management. Because of this perception, public officials, even when convinced that PAYT is the best system for managing their town's solid waste, are often reluctant to implement PAYT. However, numerous national studies have indicated that once a PAYT program is established, most residents embrace it and support it and don't want to go back to traditional trash pricing. There are over 6,000 towns nationwide that have adopted PAYT pricing.

Due in part to the issues listed above, only a small number of Connecticut municipalities have implemented PAYT, in spite of efforts by the CT DEP to promote PAYT through workshops; focus groups; development and distribution of PAYT implementation manuals; meetings with individual town officials and governing boards; and incentives such as grants for start-up costs and free consulting services. The CT DEP needs to work with a subcommittee of the Agency Solid Waste Management Advisory Committee to identify effective incentives for local governments and haulers to adopt PAYT pricing systems.

Strategy 2-5. Increase technical assistance, education and outreach, and enforcement with regard to the business and industry sectors (especially the small businesses) and institutions to decrease their waste disposal rates by increasing recycling and source reduction. Promote EPP, including recycled content products, by Connecticut's businesses, industries, and institutions.

Greater efforts on education and outreach, technical assistance, and enforcement need to be focused within the business and industry sector (especially the small businesses) and institutions to improve their source reduction activities and recycling participation rates. The purchase of environmentally preferable products (which includes recycled content products) by businesses and institutions also needs to be promoted.

- The CT DEP recognizes that many small businesses in Connecticut can do more with regard to recycling. The CT DEP will work with the small business sector, regional waste authorities, Chambers of Commerce, the custodial industry, municipalities, waste haulers, and the Connecticut Business Environmental Council (CBEC) to identify recycling programs that will provide convenient, cost effective recycling collection models for small businesses and will promote the implementation of such programs statewide. There will also be targeted enforcement against small businesses not complying with recycling requirements.

  The solid waste generated by most small businesses (except restaurants) consists mostly of high grade office paper and corrugated cardboard. The CT DEP will focus on the following actions to increase the existence and effectiveness of small business recycling programs throughout the state:

  - Support funding for CBEC or similar organizations to design and identify effective new strategies for small businesses to increase recycling and composting. CBEC currently conducts waste reviews, and works with businesses to increase recycling awareness, encourage waste reduction, improve compliance with recycling requirements, and promote the purchase of products containing recycled content.
  - Provide increased education and technical assistance on recycling by working through regional business organizations, trade groups, and chambers of commerce, and custodial companies.
  - Promote participation in national programs to assist with source reduction and recycling (e.g., EPA's Waste Wise Program).
  - Develop a public recognition program for successful small business recycling efforts.

- Commercial building management companies may not be providing recycling programs for the tenants in their buildings. The CT DEP, in partnership with associations such as the Building Owners and Managers Association ("BOMA"), municipalities, regional recycling entities, CRRA, waste haulers, and CBEC, will reach out to this sector to provide recycling education and technical assistance and

will ultimately enforce against those failing to implement recycling programs in the buildings they manage.

- Similarly, larger businesses and institutions have the potential to reduce the amount of disposed waste and lower their disposal costs by renegotiating hauler contracts to provide hauler incentives for recycling more and disposing less of the waste they generate. The CT DEP will work with this sector to research and, if determined appropriate, introduce this type of contracting (providing hauler incentives to dispose less and recycle more) and promote its use.
- The CT DEP will target a "buy recycled" campaign toward Connecticut businesses and institutions through the promotion of programs such as the National Recycling Council's "Buy Recycled Business Alliance".
- Other efforts that will be undertaken by the CT DEP will include: increased education and technical assistance; publicizing successful business recycling efforts; promoting national programs to assist with source reduction and recycling; and increasing enforcement of recycling requirements through targeted inspections.

Strategy 2-6. Continue the CT DEP's Municipal Recycling Honor Roll Awards Program and the Green Circle Awards Program to recognize and support exemplary source reduction and recycling practices.

Award programs can help to provide public recognition for exemplary source reduction, recycling efforts being undertaken to promote the environmental agenda of the State. Two such award programs are the CT DEP's Municipal Recycling Honor Roll and the Agency's Green Circle Awards. CT DEP will continue to use and profile these programs as a tool to boost awareness of source reduction, recycling and composting activities being undertaken within the State. The awards will be in accordance with other priorities identified in this Plan.

Strategy 2-7. CT DEP in collaboration with regional authorities and the hauling industry will identify incentives for haulers to increase the amount of material recovered for recycling.

CT DEP and regional recycling authorities will provide on-going assistance to waste collectors in providing recycling education for their customers. The current system for motivating generators and haulers to assure that mandated recyclables are being recovered are not effective. CT DEP will work with the hauling industry to create more effective incentives for recovering more recyclables from the waste stream and will identify and implement more effective disincentives for failing to do so.

Strategy 2-8. Develop the infrastructure necessary to increase the amount of paper that is recycled. Create incentives and funding for increased paper recycling and for source reducing the amount of waste paper generated.

Markets, many overseas, for paper collected for recycling have improved significantly and have remained relatively stable in recent years (as compared to the historic volatility of these markets) and are expected to remain stable. This favorable climate

should enable Connecticut to create programs, incentives and infrastructure to divert significant additional amounts and types of paper from the waste disposal stream.

To take advantage of these circumstances the State will:

- Encourage regional Intermediate Processing Centers and other recycling facilities to follow the lead of CRRA and Willimantic Waste and explore the feasibility of developing the necessary infrastructure to recycle additional amounts and types of paper; and
- Encourage municipalities, businesses (especially small businesses and businesses in multi-tenanted commercial buildings), and haulers to collect and recycle additional amounts and types of paper, including (1) high grade white office paper both from the non-residential and the residential sectors (more and more of this paper is being generated at home – due to the proliferation of home personal computer use) and (2) some types of paper mixes (depending on stable market availability).

The State will seek partnerships (with paper processors, paper mills, and paper industry associations) and will provide technical assistance to large generators of waste paper to help reduce the amount of waste paper generated and maximize the amount recycled.

All State agencies will be required to take steps to ensure that all mandated paper types are recycled and will be encouraged to explore options for increasing the types and quantities of paper collected and recycled.

Strategy 2-9. Support the continued recycling of non-mandated recyclables.

- Because the markets and recycling infrastructure already exist in some parts of Connecticut for various MSW materials which are not required to be recycled, those recycling programs should be supported and, if feasible, expanded for items such as: anti-freeze, latex paints, PET (#1) and HDPE (#2) plastic bottles, textiles, old magazines, residential high grade paper, residential mixed paper, and paper beverage containers (such as milk and juice cartons).
- As markets and infrastructure become available the CT DEP will promote the recycling of other items for which markets and recycling infrastructure are just developing, including: certain types of carpeting, ceiling tiles, etc. The CT DEP encourages pilot projects, when determined necessary, to test the feasibility of recycling some of these materials.
- The CT DEP will assess and revamp Connecticut's current beneficial use program to eliminate requirements which do not protect the State's environment but which present barriers to increased reuse or recycling.

Strategy 2-10. CT DEP and a subcommittee of the Agency's Solid Waste Management Advisory Committee and other State Agencies will work with recycling business representatives to facilitate the development, expansion, and creation of markets for recycled materials.

Establish a subcommittee of the Agency Solid Waste Management Advisory Committee to identify ways to assist processors, end-users and reuse companies to overcome market barriers and increase value-added beneficial use of recovered materials and to help provide up-to-date information on market trends. High priority market sectors will initially include C&D waste, food waste and other organics, and electronics. Consideration should be given to identify changes to any tax laws that will eliminate any disincentives and create incentives that will foster recycling and reuse for these materials.

Strategy 2-11. Build local, regional, and state capacity for implementing State recycling policies, regional planning and program implementation, and recycling information sharing.

- Funding needs to be provided for municipal and/or regional recycling coordinators to promote, assist, and enforce recycling in the municipalities.

  The success of Connecticut's recycling program is contingent upon efforts by each municipality (either through it own recycling coordinator, or through a recycling coordinator shared by a group of towns, or through a regional recycling coordinator) to:

  - Assure the compliance of municipal residents (including those in multi-family dwellings), businesses, and organizers of special events with recycling requirements pursuant to local recycling ordinances and mandates;
  - Promote recycling through educational outreach and incentives and technical assistance;
  - Share information among municipalities and regions.

- Recycling and composting programs need to evolve over time to keep up with changes in markets, waste composition, more effective and efficient technologies for collection and processing of recyclables, and lessons learned. The challenge is that local program managers do not have time to stay abreast of these changing best practices and to identify how to adapt them to their community's needs. To address this need, technical and financial assistance programs must target both local governments and, where appropriate, regional entities. The type of technical assistance to be provided will include assistance with local system optimization, especially development of contractual agreements and pricing systems that provide strong incentives for waste diversion; and evaluating opportunities to improve local system effectiveness and efficiency. The technical assistance program will require close coordination with all providers of education and outreach and other

related strategies to reinforce the State's desire to move towards more-consistent, effective programs over time.

- To further assist and encourage local and regional programs to improve performance, the Department will seek funding to re-establish a program of innovation grants to municipalities and recycling regions. The grants can be awarded based on a solicitation for innovative approaches that serve the State's overall objectives of reducing solid waste disposal. A portion of the funding can be reserved for top-priority efforts as determined by the CT DEP on an annual basis.

Strategy 2-12. CT DEP and regional recycling entities will work to build partnerships with groups that can assist with and support the State's recycling efforts. Potential partnerships include regional recycling programs, municipalities, CRRA, trade associations, non-governmental organizations (NGOs), universities and others.

Strategy 2-13. CT DEP will designate a "state source reduction/recycling coordinator" to coordinate and implement the strategies described in this section and other sections of the Plan to increase source reduction, recycling, and composting.

Specific Strategies for Organics Recycling/Composting

Strategy 2-14. Identify the internal barriers and solutions to streamlining the permitting process for source separated organic material recycling, especially for those institutional, commercial and industrial operations that process food scraps, soiled paper and waxed cardboard.

Some approaches that could be undertaken include:

- Amend state permitting and regulatory requirements to encourage source separated organic material recycling. The CT DEP will prioritize and fast-track source separated organic material recycling permit applications that are consistent with the goals set forth in the State Solid Waste Management Plan.
- The CT DEP will investigate the feasibility of creating an allowance for the composting of small volumes of some types of food scraps at appropriately sited and managed existing registered leaf composting facilities.
- The CT DEP will seek to partner with the State Dept of Agriculture to expand on-farm composting and create an agricultural exemption, that allows agricultural composting operations with approved agricultural waste management plans to add source separated organic material. Farms can continue to play an important role in composting a variety of waste streams that are not necessarily generated on-farm. As the amount of food scraps collected is increased, there will also be a need for facilities to process them. Manure, particularly bedded horse manure, makes a perfect bulking agent and carbon source with which to blend high nitrogenous feedstocks like food scraps. Anaerobic digestion of manures on farms can be

developed and expanded to include slurry made from food residuals. There is an opportunity to prevent pollution from mismanaged manure piles and over application of manure on unsuitable soils, and also reduce the waste stream by creating well-managed farm composting facilities. Diversifying farm operations to include composting and anaerobic digestion could help agriculture become more sustainable and contribute to farming income. Compost products can be used as soil amendments and other landscaping applications.

Strategy 2-15. Establish a subcommittee of the Agency's Solid Waste Management Advisory Committee to discuss options that could stimulate organics recycling especially food scraps, soiled paper and waxed cardboard from the institutional, commercial and industrial sectors.

- Target groups of commercial and institutional generators that generate the most food waste and have the best opportunity to cost-effectively divert food waste from disposal such as supermarkets, hospitals and other health care facilities, hotels and convention centers, colleges and universities, and state institutions such as prisons.
- Seek statutory authority to create economic incentives through tax relief, grants, low interest loans, bonds, etc. to attract the siting of large-scale source separated organic material processors to Connecticut.
- Federal monies from agriculture and energy departments may be available for start-ups.
- Funds may be available from the Connecticut Clean Energy Fund.
- Identify and seek funding for related research for large-scale organics recycling/composting facilities; of particular interest are anaerobic and aerobic digestion technologies that can handle food waste.

Strategy 2–16. Include compost and compostable materials in a statewide or regional on-line materials exchange to link generators of source separated organic material with processors and compost users.

The exchange will include and maintain a data base of compost generators, processors, and end users and will provide information on the type of organic material according to moisture content and carbon:nitrogen ratio to facilitate the recycling, marketing, and use of the source separated organic material.

Strategy 2-17. Encourage the marketing of compost products for such uses as, erosion control, potting soil blends, topsoil blends, playing field mediums, etc.

The CT DEP will continue to work with regional organizations and other state agencies to establish State procurement specifications for compost products (e.g., topsoil, mulch) and standards for the use of compost products by state agencies. The CT DOT has already developed specifications that allow for the substitution of

compost for peat in planting soil backfill. The CT DEP will continue to promote large-scale demonstrations of the use of compost products.

Strategy 2-18. Promote home composting and grasscycling.

Seek funding to re-establish a home compost bin grant program whereby municipalities and non-profits can provide residents with low-cost bins. Promote available technical assistance to residents to encourage composting of food scraps and yard trimmings on-site via brochures, videos, and website. Convert CT DEP's home composting and grasscycling videos to more current CD technology.

4.3.3 Objective 3. Management of Solid Waste Requiring Disposal

Assure that the need for new disposal capacity is minimized, that existing solid waste facilities are used as efficiently as possible, and that the public is fully aware of the potential need for and impacts of disposal options, and is also able to participate meaningfully in any application process and also, assure the availability of sufficient appropriate and environmentally sound long-term disposal capacity (consistent with the state mandated hierarchy for managing solid waste) for Connecticut solid waste requiring disposal.

Overview of Solid Waste Disposal

Even as Connecticut moves toward maximizing the amount of waste that is source reduced, recycled and composted, there will continue to be a need to dispose (in an efficient, equitable, and environmentally protective manner) of most of the waste that is generated. This section will discuss the portion of the MSW, RRF ash residue, and C&D waste/Oversized MSW waste streams that must be disposed. Since the late 1980s, Connecticut has developed a strong infrastructure in-state for managing the municipal solid waste that is generated. However, the situation today finds this infrastructure lacking. In-state disposal capacity shortfalls exist for both the MSW and C&D waste/Oversized MSW waste streams, and these shortfalls are projected to increase, if existing trends continue, through the year FY2024. Of the two ash residue landfills located in the State, one (CRRA's Mid CT facility) is expected to close in October 2008, while the privately owned Putnam facility is expected to close in the year 2019.

Connecticut relies heavily on the six MSW resources recovery facilities for the safe disposal of the State's municipal solid waste that is not recycled. Over the next ten years, one of these facilities may close and three of the facilities may shift from public to private ownership. On a regional and national level, the private waste management sector has consolidated, and has constructed several large-scale solid waste landfills in other states that provide significant disposal capacity for MSW, RRF ash residue and C&D waste/Oversized MSW.

The projections for the disposal needs of MSW and RRF ash residue are based on the State achieving a 49 percent disposal diversion rate by the year FY2024. Even if

Connecticut meets this aggressive diversion goal, projections indicate that the State will still have an in-state disposal capacity shortfall for MSW of 614,000 tons in FY 2024. To eliminate the projected FY2024 MSW in-state disposal capacity shortfall, Connecticut would need to achieve a 61 percent disposal diversion rate in FY2024. If, by FY2024, Connecticut does not achieve a 61 disposal diversion rate or meet the 49 percent goal, but maintains the current 30 percent disposal diversion rate, the in-state shortfall amount would total 1,597,000 tons by the year FY2024. Projections for RRF ash residue indicate that in-state capacity exists until the year FY2019. For C&D waste/Oversized MSW, the current reported seven percent diversion rate, combined with the limited in-state disposal capacity available, results in an in-state disposal capacity shortfall of approximately 910,000 tons. If the disposal diversion rate stays constant, the projection for in-state disposal capacity shortfall for C&D waste/Oversized MSW is 1,436,000 tons by the year FY2024. It is recognized that much more needs to be done to increase diversion of this type of waste from the disposal stream.

Over the past few years, a steadily increasing amount of Connecticut's solid waste has been disposed at out-of-state facilities, mostly landfills. This can be attributed to a number of factors, including the increasing MSW generation rate; the stagnant MSW recycling rate; the lack of sufficient in-state disposal capacity (which is projected to continue to decrease) for MSW and C&D waste/Oversized MSW; and the lack of significant C&D source reduction or recycling. The degree to which this shortfall can continue to be managed at out-of-state disposal facilities is based on the availability and reliability of the out-of-state disposal options and acceptability of the associated environmental and economic risks.

It is impossible to predict with certainty whether reasonably priced out of state options will remain available into the future. At the present time, despite the shortfall that exists, reliable and economically competitive options exist for disposal of all MSW generated in Connecticut. While it is good public policy to manage Connecticut's waste within its own borders, we do not control all the market forces that influence the development and location of new waste management facilities. Therefore, absent a mandate to create additional state sponsored waste management infrastructure, the Department must continue to monitor the disposal capacity situation and advise decision makers of any significant changes to the overall solid waste management system that create greater uncertainty or increased risk.

Current Management of Connecticut Solid Waste Requiring Disposal

This section provides a brief synopsis of Connecticut's waste disposal system and needs, while disposal issues, costs and environmental considerations are described in detail in Appendices F, G and I respectively.

MSW Disposal Management System

Connecticut's MSW disposal system has changed significantly since the mid-1980s when most of Connecticut's MSW was landfilled in-state. Currently in Connecticut, approximately 82 percent of the MSW that needs disposal is processed at in-state

RRFs. Of the remaining portion of the waste that needs disposal, a small amount is buried at in-state landfills and a small but growing amount (about 12 percent) is transported to other states for disposal. Transfer stations have become an increasingly important component of Connecticut's MSW management system. They serve as aggregation points for efficient transport of MSW to the in-state RRFs and landfills, as well as to out-of-state disposal facilities.

At the present time, there are six resources recovery facilities (RRFs) in Connecticut that process MSW with a combined maximum permitted design capacity of 2.5 million tons per year. Table 4-5 provides a listing and location of the RRFs, their maximum permitted design, the year when bonds will be paid off, the number of towns contracted with each facility, the 2005 tipping fees and the services covered under the fees, the ash disposal sites, and the post contract ownership. RRFs provide MSW disposal for approximately 140 out of the 169 municipalities in the State. The disposal capacity for all but one facility is substantially utilized under long-term contractual waste delivery commitments. All six facilities have at least 20 years of remaining useful life assuming normal maintenance and on-going upgrading of environmental control technologies. However, the Wallingford project is currently operating under an energy contract with a very favorable energy price, and this contract will end in 2009. The result will be that Wallingford's post-contract energy revenues are likely to be significantly lower than they currently are, necessitating a significant increase in tip fees to offset these losses. As part of the identification of future disposal options and needs, this Plan evaluates the possibility that the Wallingford facility will cease operating in 2009 (because it may not be economically feasible to continue operating), and that the capacity it currently provides will no longer be available. Of the six MSW RRFs, all but Lisbon and Bristol facilities are part of the CRRA system. Individual community contracts with the facilities all expire between 2008 and 2015.

There are presently two Connecticut landfills permitted to accept MSW. CRRA operates the Hartford landfill and uses it primarily for process residue, and other wastes that cannot be processed at the Mid CT RRF. This landfill is projected to reach permitted capacity and close in 2006. The other landfill permitted to accept MSW is the Windsor-Bloomfield Sanitary Landfill owned by the Town of Windsor, which is projected to reach permitted capacity and close in 2007.

With minimal MSW landfill capacity, and essentially fixed RRF capacity, out-of-state disposal facilities serve as the only additional option for MSW requiring disposal.

RRF Ash Residue

Connecticut's six MSW RRFs generate ash residue from combustion and must dispose of this waste in specially designed, lined landfills. RRF ash residue is currently disposed at two ash landfills in Connecticut: the Wheelabrator-owned Putnam Ash Landfill, which receives most of the Connecticut RRF ash residue, and the CRRA Hartford Landfill, which accepts ash residue from the Mid-CT RRF. The Bristol RRF is under contract to send its ash residue to the Seneca Meadows Landfill in New York through June 2008. The ash residue landfill in Hartford is expected to reach capacity

in October 2008, leaving the Putnam facility as the only operating site in the state. Based on the assumptions that the Wallingford RRF will cease operations in 2009 and that no new in-state RRF capacity will be built, it is projected that the Putnam site will have capacity until some time in FY2019.

C&D Waste/Oversized MSW

Oversized MSW is generally managed with C&D waste. Connecticut has very limited landfill disposal capacity for C&D waste/Oversized MSW. Although data reported to the CT DEP regarding this waste stream is incomplete, FY2004 data reported by Connecticut C&D volume reduction facilities, landfills, RRF's and transfer stations indicates that 911,303 tons or 81 percent was transported out of state for disposal. Just under 12 percent of this waste stream was buried in CT landfills, and less than one percent was burned at CT RRFs. Connecticut Volume Reduction Facilities ("VRFs") currently recycle a relatively small portion of the waste they receive for processing; the majority of the waste undergoes grinding and is disposed at landfills.

In order to meet the goals identified in this Plan, Connecticut needs to substantially increase recovery of C&D waste/Oversized MSW in the coming years. However, because data regarding solid waste being delivered to in-state VRFs, transfer station, and landfills is reported as "mixed C&D" waste or as "bulky waste" and is not broken down by waste streams, i.e. construction waste, demolition waste, wood waste, or oversized MSW, it is difficult to estimate the portion of each that can potentially be recovered. It is therefore also difficult to estimate with accuracy the amount of C&D waste disposal capacity that will be required throughout the planning period.

Table 4-5
MSW RRFs in Connecticut

Selected information	Bridgeport RRF	Bristol RRF	Mid-CT RRF	Southeast RRF	Wallingford RRF	Lisbon RRF
Maximum Permitted Design (Processing) Capacity (TPY)	821,250	237,250	888,888	251,485	153,300	195,640(1)
Year Bonds Will Be Paid Off	2008	2014	2012	2015	2010	2020
Operator	Wheelabrator	Covanta	MDC/ Covanta	Covanta	Covanta	Wheelabrator
Number of Towns Contracted (2)	19 (Towns contracted to CRRA; CRRA has contract with Wheelabrator)	14	70	16	5	5
2005 Member Tipping Fee	$69	$66	$70	$60	$57	$60-$66
Fee Covers	Disposal, Recycling Education, Recyclables Processing at Stratford IPC for Residential Recyclables	Disposal	Transfer, Disposal, Recycling Education, Recyclables Processing at Hartford IPC for Residential Recyclables (no tipping fee), Electronics Recycling	Disposal, Electronics Recycling Education	Disposal, Electronics Recycling	Disposal
Ash Disposal Site	Putnam	Seneca Meadows (NY)	Hartford	Putnam	Putnam	Putnam
Post-Contract Ownership	Wheelabrator	Covanta	CRRA	Covanta	Covanta	Eastern CT Resource Recovery Authority (ECRRA)

(1) Includes 13,140 tons/year dedicated only for processed demolition wood (based on the Lisbon RRF permit to operate)

(2) A total of 129 CT municipalities of 169 are currently under contract for MSW disposal at one of the six in-state MSW RRFs. The Housatonic Resources Recovery Authority (HRRA) communities (11) have an arrangement with Wheelabrator. Their MSW can be delivered to either the Lisbon or the Bridgeport facility. Currently most of this waste is delivered to the Lisbon facility, however it is not contracted to that facility. These 11 communities are therefore not included in the 129 contracted member communities.

Present waste disposal practices in Connecticut for FY 2004 are captured in the following figures.

- **Figure 4-2** shows the disposal of Connecticut-generated MSW at in-state RRFs and landfills and out-of-state disposal facilities for the period FY 2004.

- **Figure 4-3** shows the disposal of ash residue generated by the in-state RRFs and the waste being directed to either in-state or out-of-state ash residue landfills for the period FY 2004.
- **Figure 4-4** shows the disposal of C&D waste/Oversized MSW being directed through in-state transfer stations and volume reduction facilities to in-state landfills or RRFs, and to out-of –state disposal facilities (mostly landfills) for the period FY 2004.

Figure 4-2
Disposal of Connecticut-Generated MSW
FY 2004

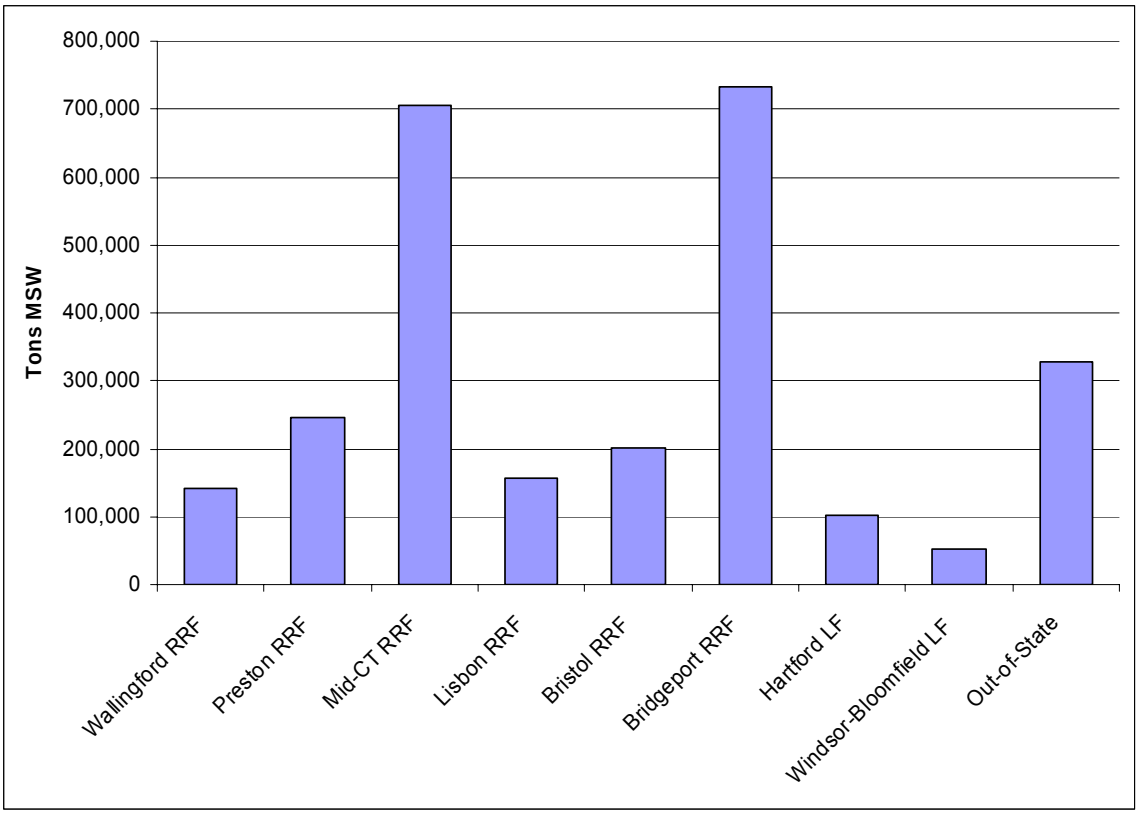


Figure 4-3
Disposal of Ash Residue Generated by Connecticut RRFs FY 2004

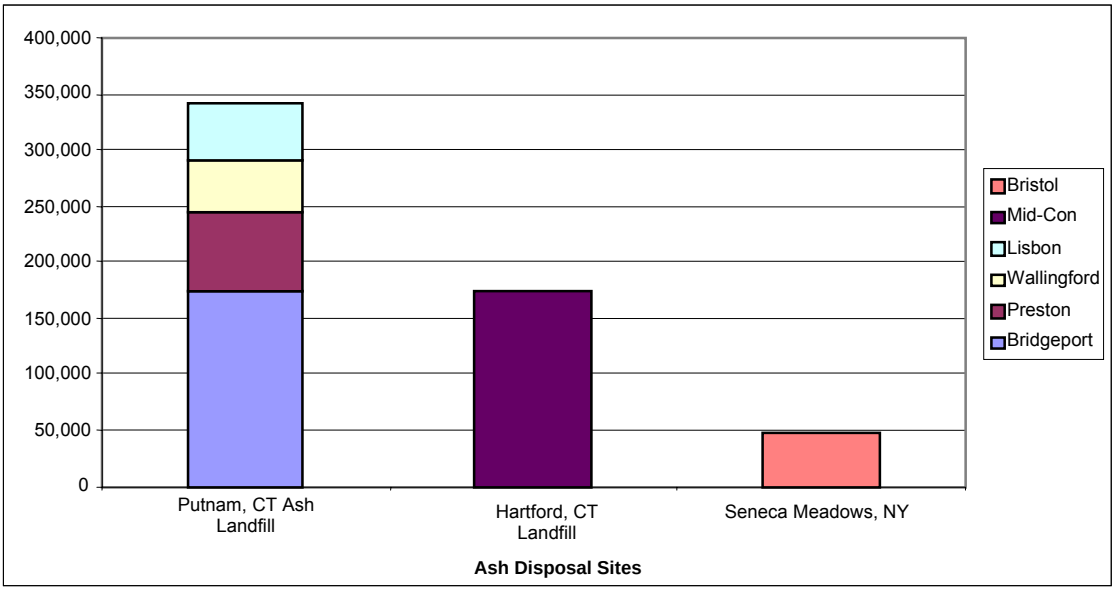
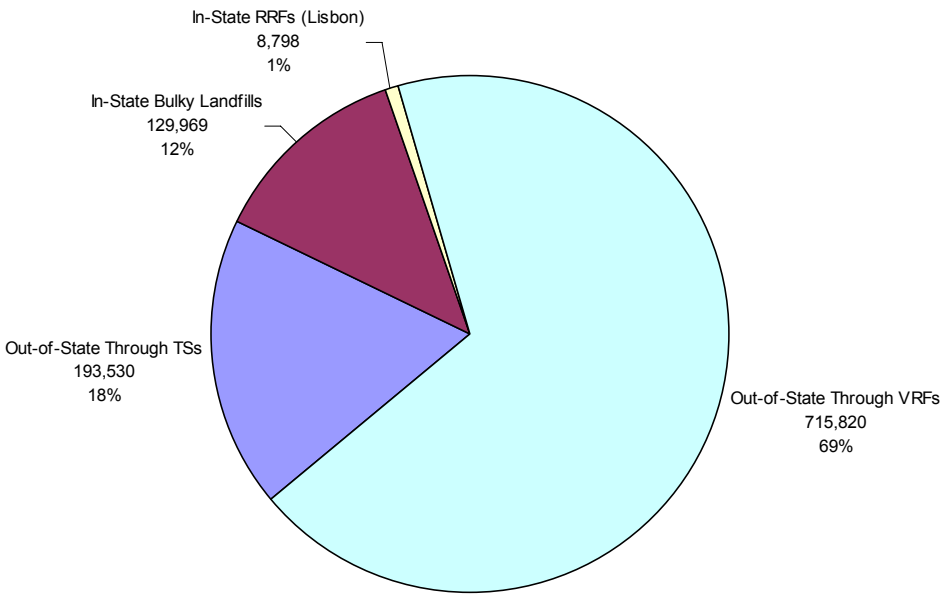


Figure 4-4
Disposal of C&D Waste and Oversized MSW FY 2004



Barriers and Issues to Solid Waste Disposal

There are a number of social, economic and environmental barriers and issues related to disposal of solid waste both in-state and out-of-state. Some of these include:

Barriers and Issues Related to In-state Disposal

- Local opposition to new and/or expanded solid waste disposal facilities due to perceived and real burdens associated with construction and operation; e.g., traffic, noise, groundwater pollution and odors;
- The public perception that combustion of MSW is hazardous to public health and the environment;
- Limited numbers of large sites that would meet Connecticut's environmental siting requirements for a new disposal facility;
- Disposal contracts at the resources recovery facilities will be expiring in a few years, leaving the future uncertain in terms of waste delivery (and tip fee revenues) to the RRFs. Municipalities may choose to deliver their waste elsewhere (potentially out-of-state), or have no long term contract and "shop" for the best deal;
- Inadequate data, in particular pertaining to C&D waste/Oversized MSW, on which defensible projections of diversion and/or recycling can be based;

- Lengthy and costly permitting requirements;
- Uncertainty in the electricity marketplace, which makes a significant source of RRF revenue difficult to plan for.

Barriers and Issues Related to Out-of-State Disposal:

- Cost and availability uncertainty.
- Environmental impacts of transport.
- Social acceptability for managing Connecticut's waste elsewhere (out-of-state).
- State environmental regulatory enforcement and permitting of disposal facilities in other states may not be as stringent as Connecticut's.

Opportunities, Priorities and Strategies for Disposal

MSW

The data show that the amount of MSW generated in the State exceeds the capacity of disposal facilities in the State. This "shortfall" for FY2005 was estimated at approximately 327,000 tons per year, representing 12 percent of the total Connecticut MSW disposed. If no steps are taken to improve the State's MSW rate of diversion from disposal and if Connecticut maintains its current disposal diversion rate of 30 percent, then by the year FY2024, the shortfall will represent 44 percent of the amount of MSW disposed.

The degree to which this shortfall presents a problem depends on the availability, reliability, potential for environmental harm, costs and environmental justice issues of the disposal options available and ultimately used by Connecticut MSW generators. The responsibility of the State of Connecticut is to assess these issues and take prudent steps to ensure that capacity exists for the safe and reliable disposal of Connecticut generated MSW. In meeting this obligation, the State needs to consider several factors including the following:

- Problems that could result from not having available, reliable and economically competitive disposal options, regardless of location, including the cost and availability of out of state disposal options.
- Environmental, cost and societal impacts resulting from the construction and operation of resource recovery facilities and landfills, whether "needed" or not.
- The Determination of Need requirements of Section 22a-208d of the General Statutes, which say that the DEP can approve applications for new or expanded resource recovery or ash residue capacity only if such facilities "…are necessary to meet the solid waste disposal needs of the state and will not result in substantial excess disposal capacity…"
- Consistency of any proposed new capacity with this Plan, as required by Section 22a-229 of the General Statutes.
- The long term viability of existing and planned disposal capacity.

- New technologies, methods or programs that may be available for disposal, recycling, reuse or other steps that can be taken to safely dispose of waste or reduce the amount of waste requiring disposal.

Other important factors must be considered in evaluating these issues. In looking at the development of new in-state MSW disposal capacity, it would be appropriate to consider the cost and environmental efficiencies associated with expansion of existing RRFs compared to developing totally new sites because it may be less costly and environmentally preferable to expand. In some cases, synergies may be developed by expanding capacity utilizing technologies that complement existing facilities.

These factors must be weighed against the added social costs of expansion. Bridgeport and Hartford facilities are located in urban areas where environmental justice issues are of significant concern. Therefore, it will be critical for any application for expanded capacity in these areas to be fully discussed, debated and understood by the public.

In summary, additional MSW disposal capacity in Connecticut must only be developed in a way that:

- Does not impede efforts to maximize source reduction, recycling and composting (for example, efforts to maximize disposal diversion are impeded by committing waste to disposal through long-term contracts with put-or–pay clauses);
- Involves local communities and considers issues of environmental justice;
- Minimizes environmental harm associated with transportation and disposal practices over time;
- Minimizes economic costs of site development, ongoing transportation and disposal tip fees; and
- Is based on objective, scientific information used to evaluate options.

RRF Ash Residue

When RRF ash residue disposal capacity is no longer available at the Hartford landfill (expected to happen by October 2008) the only available in-state disposal capacity for ash will be at the privately owned Putnam landfill which is expected to reach capacity by 2019. Because of the lengthy and controversial application process that can be expected, it would be important for applications for ash disposal capacity to be submitted with a sufficient lead-time.

Construction and Demolition Waste/Oversized MSW

There is a significant in-state capacity disposal shortfall for this waste and it is projected to keep increasing. While the State will increase efforts to maximize the amount of C&D waste/Oversized MSW diverted from disposal, there will still be a significant amount that will require disposal. Currently, the disposal options are mostly out-of-state, with very limited and decreasing in-state options. This situation presents opportunities for the development of new in-state disposal capacity that will not hamper the efforts to maximize disposal diversion. The CT DEP will prioritize

permit applications that address the current C&D waste/Oversized MSW in-state disposal capacity needs.

Strategies for Disposing Solid Waste

Connecticut will pursue the following strategies to achieve its disposal capacity objectives.

Strategy 3-1. Minimize the need for additional capacity for disposal of MSW, ash residue and C&D waste through aggressive implementation of the source reduction, recycling, composting and other initiatives in this Plan.

One of the most important means of ensuring that adequate capacity exists to handle the solid waste generated in Connecticut in the future is to make sure that the existing capacity is utilized as efficiently as possible, and that the need for new disposal capacity is kept to an absolute minimum. In order to do so the State must make maximum efforts to achieve the aggressive diversion goals of this Plan.

Strategy 3-2. The State will monitor solid waste generation and capacity on a regular basis, and with input from the Solid Waste Advisory Committee, evaluate the need for additional MSW, ash residue and C&D waste disposal capacity

The State will first maximize the efforts described in this Plan to reduce the amount of waste generated or needing disposal, in order to avoid as much as possible, the need for new waste disposal facilities in Connecticut. At the same time, the State must recognize that a growing in-state disposal capacity shortfall exists for C&D waste and MSW and that existing disposal capacity for RRF ash residue will be exhausted by the year 2019. It will therefore be critical for the State to monitor these issues so prudent action can be taken to ensure that adequate capacity is available in the future.

Strategy 3-3. The Department will seek legislative authorization to require any applicant for new RRF or landfill capacity, at the time any application is submitted to DEP, to create a fund to be accessed by the host municipality, to (1) create a local advisory committee and (2) hire appropriate experts, to assist the host municipality in reviewing the application and taking part in the application process. The advisory committee should include elected officials and residents from both the host community and contiguous communities.

The most significant effects from the creation and operation of new waste disposal facilities are local; however, residents and elected officials often feel that they have insufficient opportunity and expertise to properly review and comment on any application for these facilities. Therefore, following the process used by the U.S. EPA's Superfund Program, meaningful local participation in the application process should be supported financially by the permit applicant to help address this issue.

Strategy 3-4. Seek legislative authority to ban un-processed C&D waste from being disposed at any new Connecticut landfills, or Resource Recovery Facilities, or being delivered to any new Connecticut Transfer Stations (which transfer such waste to disposal facilities), and by a date certain extend the ban to existing landfills, RRFs, and transfer stations.

Disposal capacity for C&D waste in Connecticut is very limited, and it is likely that applications for new capacity will be submitted over the next few years. In order that any such new capacity does not create a disincentive for diverting C&D waste toward recycling or reuse, the state should ban disposal of unprocessed C&D waste (meaning the C&D waste must first be processed to recover as much material as possible for reuse and recycling and then volume reduced).

Strategy 3-5. Research and track new solid waste management technologies that have the potential to reduce environmental impacts and maximize benefits.

Solid waste processing technologies are constantly changing. For example, new gasification and other so called "conversion technologies" are under development that potentially could provide a more economical and efficient means of recovering the energy value of waste. Studies should be performed, that evaluate new solid waste management processing technologies that have the potential to reduce environmental impacts, such as air pollution and the creation of byproducts that must be managed, and maximize benefits – such as the generation of energy and/or other beneficial products. A major focus of these efforts should be to evaluate the potential for the beneficial reuse of MSW ash residue.

4.3.4 Objective 4. Management of Special Wastes and Other Types of Solid Waste

Maximize source reduction, recycling, and beneficial use of special waste and other types of solid waste in a manner that protects human health and the environment; and also assure that special waste and other types of waste that require disposal are disposed in compliance with the State's solid waste management hierarchy in facilities that meet all regulatory standards for protectiveness of human health and safety, natural resources and the environment.

Overview of Special Wastes and Other Types of Waste Management

Special waste includes a variety of wastes requiring handling different from that appropriate for MSW. In this section, certain special wastes are addressed in detail, including C&D waste, land clearing debris, oversized MSW and electronic wastes. Other special wastes are also addressed, but to a lesser extent, and these wastes include household hazardous waste ("HHW"); animal mortalities; road wastes (street sweepings and catch basin cleanings); contaminated soils; dredge materials; sewage sludge; pressure treated wood; sharps and waste pharmaceuticals; and disaster debris.

Special Waste Management: Current Practices, Barriers to Management, Opportunities and Priorities

A brief description of current practices and issues associated with some of these waste streams is provided below. The management of special wastes is described in more detail in Appendix H.

Construction and Demolition (C&D) Waste

Overview of C&D Waste

C&D waste is the waste stream generated as a result of activities such as construction, renovation, repair, and demolition of buildings, dams, piers, bridges, and paved surfaces such as roads, highways, and parking lots. C&D waste typically consists of larger sized material and varies widely depending on activity type. It includes asphalt, concrete, brick, soils, wood, metal, wallboard, roofing, insulation materials, plastics, cardboard, glass, packaging and miscellaneous trash. Although Connecticut categorizes and regulates construction waste as a distinct type of MSW and demolition waste as a type of "bulky waste" (a subset of "special waste"), C&D waste is discussed in this Plan as its own waste category because it is managed as a single waste type. Other wastes sometimes managed with C&D waste, including oversized MSW (bulky items such as furniture, mattresses, carpeting) and land clearing debris, are discussed later in this section. Although clean fill (asphalt, brick, concrete, etc.) is part of the waste stream generated by construction and demolition activities, the CT DEP does not regulate areas/facilities used solely for the disposal/processing of clean fill. Connecticut solid waste regulations define clean fill as natural soil, rock, brick, ceramics, concrete, and asphalt paving fragments which are inert and pose neither a pollution threat to ground or surface waters nor a fire hazard. There are different categories of C&D waste based on the source and/or the management of the waste: i.e. demolition debris from buildings and other structures; construction waste from buildings and other structures; and construction and demolition waste from road and highway. Table 4-6 provides a listing of the types of waste, their respective legal classification per Connecticut statutes, and examples of that type of waste.

Table 4-6
C&D Waste

Activity	Legal Classification in Connecticut of WASTE Produced by Activity	Examples of the Types of Waste
Building Demolition	Bulky waste, clean fill	Wood, brick, plaster, roofing materials, wallboard, metals, carpeting, insulation, ceramics, concrete, siding, asphalt
Building Construction	MSW, clean fill	Pallets; wood scraps; clean wallboard; siding and roofing scraps; packaging (such as cardboard); partially used paints and stains; scraps of new carpeting, foam padding, and insulation; brick
Highway construction and demolition	Bulky waste, MSW, clean fill	Asphalt, concrete, steel, related construction and demolition wastes, utility poles, railroad ties

Clean Fill - Connecticut solid waste regulations define clean fill as natural soil, rock, brick, ceramics, concrete, and asphalt paving fragments which are inert and pose neither a pollution threat to ground or surface waters nor a fire hazard. The CT DEP does not regulate areas/facilities used solely for the disposal/processing of clean fill.

Connecticut must manage C&D waste in keeping with the hierarchy mandated by state statute, CGS22a-228(b). That hierarchy establishes the following order of priority for managing solid waste: source reduction; recycling; composting of yard waste or vegetable matter; bulky waste recycling; resource recovery or waste-to-energy plants; incineration and land filling. Currently, most of the Connecticut C&D waste is disposed and only a very small amount (about 7 percent) of Connecticut C&D waste is reported recycled. These figures are only reflective of the waste which passes through Connecticut permitted solid waste facilities and is reported to the CT DEP and does not include most of the clean fill generated and reused or recycled. (Since most of those tonnages are not reported to the CT DEP).

The low recycling rate is coupled with a severe lack of disposal capacity in Connecticut for C&D related waste, resulting in most of Connecticut's C&D waste being disposed in out-of-state landfills. In FY2004, in-state C&D volume reduction facilities ("VRFs") and transfer stations (TSs) reported sending approximately 909,000 tons of Connecticut generated C&D waste to out-of-state landfills for disposal. Projections indicate that if Connecticut doesn't reduce the amount of C&D

waste disposed, then by FY2024 in-state disposal capacity shortfall for C&D waste will increase to 1,436,000 tons per year. Projections indicate that even if Connecticut increased the disposal diversion rate to 48 percent, by FY2024 the in-state disposal capacity shortfall would be approximately 801,000 tons per year.

This Plan proposes actions to increase source reduction, reuse, recycling, composting, and beneficial use of various components of the C&D waste stream. In many cases, not only is it environmentally preferable and consistent with the statutory mandated hierarchy, it is also less costly to reuse, recycle, or compost some types of C&D waste than it is to dispose of it. However, not all C&D related waste can be reclaimed and those portions will require other management options. Those other management options could include: the use of C&D clean wood in clean or renewable energy applications; the burning of some types of processed C&D waste at Connecticut resource recovery facilities or waste- to- energy facilities; the continued export to out-of-state landfills; and the disposal at newly developed in-state lined bulky waste landfills.

Current C&D related waste management practices

C& D waste is generated from the following two activities:

- C&D waste from building construction, renovation, and demolition; and
- C&D waste from highway/road construction and demolition.

C&D waste from building construction, renovation, and demolition

U.S. EPA national data cited in this section is from Characterization of Building-Related Construction and Demolition Debris in the United States, June 1998 and was prepared for U.S. EPA by Franklin Associates.

EPA estimates that 136 million tons of building-related C&D debris was generated in the United States in 1996, representing about 25 percent to 30 percent of all solid waste generated. Table 4-7 provides EPA estimates that in 1996, building demolitions accounted for 48 percent of the C&D waste stream; renovations accounted for 44 percent; and construction accounted for 8 percent of the waste generated; the table also provides estimated tons generated annually in Connecticut. EPA estimated that the per capita generation rate for building-related C&D debris in 1996 was 2.8 pounds per person per day. Applying that per capita rate to Connecticut would give an estimate of 1.78 million tons annually of building related C&D debris generated in Connecticut (based on Connecticut estimated population for July 2003). The amount of C&D waste captured in the FY 2004 solid waste facility reporting to the CT DEP indicated an annual C&D waste generation rate of 1.1 million tons; the CT DEP estimates that the amount of clean fill which is generated in-state and which is not reported to the DEP would add to the Connecticut reported amounts. It needs to be noted that the amount of C&D waste generated in any year is dependent on variables, such as storm activity and economic conditions, and therefore the amount generated year-to-year can be highly variable.

The composition of C&D debris varies significantly, depending on the type of project from which it is being generated. Building related construction activities generally produce cleaner materials than building demolition activities where waste materials might be bonded together or contaminated with hazardous materials, such as asbestos or lead paint. Waste produced by renovation projects can include both construction and demolition type wastes. Table 4-8 provides estimates of the overall percentage of materials in C&D debris generated by building related activities as determined by EPA.

Table 4-7
Estimated Building Related C&D Debris Generation (1)

Source	EPA Estimated % of C&D Waste Generated Nationally in 1996	Estimated Tons Generated Annually in CT (based on EPA per capita generation and CT population of 3,483,390 as of 7/03)
Building Related Construction	8%	142,400
Building Related Renovation (can include construction and demolition type wastes)	44%	783,200
Building Related Demolition	48%	854,400

(1) Amounts of C&D waste managed on-site are unknown and may or may not be included; roadway, bridge, and land clearing debris not included.

Table 4-8
EPA Estimated Percentage of Materials in Building Related C&D Debris (1)

Material Type	% of C&D Waste Generated EPA Estimates
Concrete and mixed rubble	40-50%
Wood	20-30%
Drywall	5-15%
Asphalt roofing	1-10%
Metals	1-5%
Bricks	1-5%
Plastics	1-5%

(1) Source: EPA - http://www.epa.gov/epaoswer/non-hw/debris-new/basic.htm

Currently, Connecticut building related C&D waste is managed in a number of ways. It can go directly to a landfill; it can be volume reduced at Connecticut C&D volume reduction facilities ("VRF") before being disposed at a landfill or resource recovery facility; or it can go to a transfer station where it is transferred to a landfill. The majority of this waste is ultimately transferred to out-of-state landfills. Very little of the building related C&D waste is recovered for recycling at C&D VRFs. Although data regarding clean fill is not generally reported to the CT DEP, it is assumed that most of the brick, concrete and mixed rubble generated as a result of demolition activity is reused or recycled at one of a dozen or so aggregate recycling facilities in the State. For FY2004, the management of Connecticut C&D waste and Oversized MSW (bulky waste and C&D waste) managed by Connecticut permitted solid waste facilities is summarized below:

- 64 percent or 717,773 tons of C&D waste/Oversized MSW was disposed at out-of-state disposal facilities after processing at Connecticut C&D Volume Reduction Facilities;
- 17 percent or 193,530 tons of C&D waste/Oversized MSW (reported as "bulky waste") was transferred to out-of-state disposal facilities by Connecticut Transfer Stations;
- 12 percent or 140,295 tons of C&D waste/Oversized MSW (reported as "bulky waste") was disposed in Connecticut (landfills and RRFs) either directly from generation sites or after processing at Connecticut C&D VRFs; and
- 7 percent or 76,751 tons of C&D waste was recycled; this percent amount excludes clean fill but includes some material reused or recycled by the CT DOT.

The following provides more information with regard to the management of building related C&D waste:

- **Volume Reduction Facilities (VRFs):** The diminishing in-state bulky waste landfill capacity and the rising cost of transporting such waste has led to increased emphasis on the processing of C&D waste material to reduce its volume for transport and disposal. As a result, much of Connecticut's C&D waste from building related activities is delivered to in-state VRFs, where a small amount of the C&D waste is sorted out for recycling purposes but most is reduced in volume (compacted or ground). The ultimate fate of C&D waste processed through Connecticut VRFs includes:
    - Landfills. Most of the C&D waste that is volume reduced at permitted VRFs is sent out-of-state and disposed at out-of-state C&D landfills (most of which are unlined). Lesser amounts of the VRF processed Connecticut C&D waste are disposed at Connecticut landfills (also unlined). It is not uncommon for some VRFs (those which are also permitted to transfer MSW) to mix MSW with C&D waste before transferring the waste to disposal facilities. Such mixed waste loads (C&D waste and MSW) may be categorized as MSW by some states which import this waste for disposal and in those states that waste may be disposed in lined MSW landfills. Some states are becoming increasingly concerned about the amount of waste they import from out-of-state and are beginning to impose requirements designed to reduce the amount of out-of-state waste buried in their landfills.
    - Resource Recovery Facilities (RRFs) and other Waste-to-Energy Facilities. A small amount of wood separated from C&D waste at in-state C&D volume reduction facilities is sent to in-state resource recovery facilities where it is burned for energy recovery. In addition, the potential to use processed C&D untreated wood waste in gasification projects to produce clean or renewable energy is being actively considered in Connecticut.
    - Recycling Facilities. Small amounts of recyclables, such as scrap metal, clean fill, and untreated wood, are recovered from mixed C&D waste received at in-state VRFs and are recycled or reused.
- **Transfer Stations:** Many transfer stations receive bulky waste (which can include construction and demolition, oversized MSW, and land clearing debris) and transfer it to bulky waste landfills, both in-state and out-of-state. These transfer stations do not process the waste and act only as aggregators of the waste.
- **Direct Haul for Disposal from Site of Generation:** Some C&D waste generated at building construction and demolition sites is hauled directly (unprocessed) to both instate and/or out-of-state landfills.
- **Used Building Material Stores and other Reuse Programs:** Some material from construction, demolition, and renovation projects are recovered for reuse. Currently there are two reconstruction centers in Connecticut that accept donations of usable used building materials for resale and re-use. These centers are the

Bridgeport CT Habitat for Humanity ReStore and the ReCONNstruction Center in New Britain; they have only recently opened and there is great potential to direct materials to these centers for reuse.

- **Concrete, Brick, Aggregate:** It is assumed that a high percentage of the inert concrete, brick, and aggregate generated as a result of building related construction and demolition activities is either crushed and used as clean fill on or off site or is reused in some other way.

C&D Waste from activities related to highway/road construction and demolition

A significant amount of highway construction and demolition waste, much of which consists of aggregate material, is reused or recycled. For FY2003, the CT Department of Transportation (CT DOT) reported reusing 393,984 tons of aggregate (such as concrete and bituminous asphalt) as clean fill; reusing 7,352 tons of wood from posts and structures; and recycling 2,547 tons of steel from rebar, sheeting, and building structures. Depending on the type of contract and which division of the CT DOT administers the contract, milled material generated by CT DOT asphalt milling projects may or may not become the property of the contractor. Either way the material is reused. If CT DOT takes ownership of the millings, it finds a use for them in road construction such as in shoulders along roadways, as base materials at maintenance facilities and storage areas, for access roadways, other uses. Contractors do, however, acquire a major portion of the millings produced each year. C&D waste from road and highway construction that is not recovered is disposed in landfills.

Barriers to Management of Construction and Demolition Wastes

Listed below are some of the more significant barriers to properly addressing the management of C&D waste:

- **Possible toxicity of some components of the demolition waste stream.** Some components of the C&D waste stream can contain material contaminated with potentially hazardous substances (such as asbestos, lead), and any management options pursued for this waste stream must take this into consideration.
- **Limited markets for waste associated with C&D activities.** In general, the State has not supported research and development of C&D waste recycling options and market development. In addition, markets have been stifled by misconceptions about building materials made with recycled content and building codes and architectural/engineering specifications that have excluded the use of building materials with recycled content. Markets have historically existed for some components of C&D related waste such as clean fill, clean wood, scrap metal, and cardboard, while viable markets for other components have not been readily available. However, with green building becoming increasingly popular, the private sector is developing markets in close enough proximity to Connecticut to make some recycling cost effective for materials such as dry wall and asphalt roofing shingles. In addition there have been increased efforts recently in Connecticut to recover usable building components (such as doors, windows, cabinets, plumbing fixtures, etc) for reuse. Consumer and local and state

government acceptance and use of products made from recovered C&D related waste is still quite low. Existing markets need to be promoted and supported, and new markets need to be identified and supported for recoverable components of the C&D waste stream.

- **Lack of incentives to reduce waste associated with C&D activities.** Even though Connecticut's mandated solid waste management hierarchy prioritizes source reduction and recycling, there are only minimal efforts being made in Connecticut to recover C&D waste for reuse and recycling. Historically, recycling efforts in Connecticut and other states focused on the traditional MSW recyclables i.e. bottles, cans, paper, etc., and not on C&D waste recycling. Funding and other resources dedicated to the promotion of C&D waste source reduction and recycling has been minimal at best. With the exception of cardboard and scrap metal, Connecticut has no other mandates or incentives for volume reduction facilities, haulers, contractors, developers, demolition companies, or other generators or handlers of C&D related waste to generate less waste and/or to recover more material for recycling or reuse. Source separation of reusable or recyclable materials at C&D waste generation sites can sometimes be difficult due to space, cost, and logistical barriers. It is easier and more convenient, to throw everything in one container, compact or grind it to reduce the volume and send it to an out-of-state landfill for disposal. This is the current method by which much of Connecticut's C&D waste is being handled. There is generally little awareness or concern regarding the environmental costs of generating and disposing of C&D related waste in this manner and no incentive to change. The State has not yet focused out-reach programs to try and change these entrenched practices for dealing with C&D waste. In addition, the State's beneficial reuse policies do not appear to facilitate innovative C&D waste recovery alternatives.
- **Lack of in-state disposal capacity for C&D related waste.** There will always be components of the C&D related waste stream that cannot be source reduced or recovered for reuse, or recycling, or composting, and these components will need to be disposed or otherwise managed. Available disposal space in Connecticut for C&D waste is minimal and none of Connecticut's bulky waste landfills are lined. There has not been a new landfill sited in Connecticut in many years. This can be attributed to various factors, which can include the State's siting requirements, as well as public opposition to the siting of such a disposal facility in Connecticut. Since some components of the C&D waste stream can contain material contaminated with potentially hazardous substances, and as recycling makes these components a greater percentage of the disposal stream, landfills that receive this waste will need to be lined to help ensure protection of the state's environment and the public health.
- **Incomplete data regarding the amount and types of C&D related wastes generated.** Planning for C&D related waste management is further complicated by the lack of complete data. Any Connecticut C&D waste which is managed on site, or is collected and hauled directly out-of- state or to an end user, without first passing through a Connecticut permitted solid waste facility is not reported to the CT DEP. In addition, the tonnage of C&D generated waste consisting of aggregate

which is inert and does not pose a pollution threat or fire hazard, and is considered "clean fill" generally is not included in reports submitted to the CT DEP by solid waste facilities.

- **State definitions.** Connecticut categories and definitions related to this type of waste are confusing, overlap, and often do not reflect current or potential management options for those wastes. The regulated community utilizes definitions of certain waste types, such as bulky waste, that differ from the definitions provided in Connecticut's General Statutes and Solid Waste Regulations and this causes unnecessary confusion and miscommunication between regulators and the regulated community.

Priorities for Managing C&D Wastes

Priorities for managing C&D waste in Connecticut include the following:

- Promote the adoption of C&D waste prevention strategies by builders, developers, architects, demolition companies, and other generators of C&D waste;
- Maximize reuse, recycling, and beneficial use of C&D related waste in a manner that protects human health and the environment;
- Improve markets for products manufactured from recycling or beneficial use of C&D waste;
- Explore new "renewable"/clean energy technologies for recovering energy from that portion of the C&D related waste stream that cannot be source reduced, reused, or recycled;
- Maintain a C&D waste management infrastructure that meets all regulatory standards for protectiveness of human health and safety, natural resources and the environment; and
- Use existing solid waste facilities as efficiently as possible for recovery and disposal of C&D waste.

Land Clearing Debris

Land clearing debris, which includes brush and stumps, is clean wood (sometimes intermingled with soil and rocks) that is a byproduct of such activities as land clearing for construction; landscaping; forest harvesting; storm clean-up; maintaining corridors for roadways, transmission lines, railroad tracks, etc. Currently in Connecticut land clearing debris is managed as follows: (1) chipped or ground and then used for mulch or as a component in compost; (2) milled for lumber or processed into firewood (but most land clearing debris is unsuitable for either product); (3) left on site to decay; (4) illegally buried on site (stumps and woodchips); (5) burned legally on-site pursuant to CGS Section 22a-174(f) or RCSA 22a-174-17; (6) dumped illegally on remote sites; (7) historically, some was chipped and sent out of state for use in boiler-fuel applications and it is unclear if this still being practiced; (8) very little if any is buried in in-state bulky waste landfills; and (9) very little is burned at in-state RRFs. The potential to use land clearing wood waste in gasification projects to produce

"renewable"/clean energy is being explored with the support of Connecticut Clean Energy Fund and by the private sector in Connecticut. Since some land clearing debris generated in Connecticut never passes through a solid waste facility, CT DEP does not get complete data on the amount generated annually nor the management technique used.

Oversized MSW

Oversized MSW is a waste category used by Connecticut regulators to include furniture, carpeting, and mattresses. It is generally handled with C&D waste because of its large size. Current waste management practices in the State include: (1) processing at VRFs mixed with C&D waste and then transferred to out-of-state landfills; (2) transfer through in-state transfer stations to landfills (both in-state and out-of-state); (3) burned at in-state RRFs; and (4) reused through swap programs at municipal transfer stations, on-line waste exchanges; building material reuse centers; charitable organizations, and consignment shops. Although reuse of some types of oversized MSW (e.g. usable furniture) is a viable option, there are few opportunities to recycle other types of oversized MSW. An industry product stewardship program to recycle carpeting is beginning to develop nationally and there are some mattress recycling (dismantling) programs located in other states. However there are currently no such initiatives in Connecticut and those options need to be explored especially in the context of product stewardship with greater producer responsibility for the management of some of these products at the end of their useful lives.

Table 4-9 provides a summary of the current and proposed management of demolition and construction waste from buildings, highway construction and demolition waste, land clearing debris, and oversized MSW.

Table 4-9
Current and Proposed Management of Certain Wastes

Types of Waste	Current Management	Estimated Generation (Tons per year)	Proposed Management
Demolition and construction waste (from buildings)	Processed at VRFs (very little recycled, most disposed). Most disposed in out-of-state landfills. Some disposed in Connecticut landfills or RRF's (requires special waste authorization from the CTDEP for disposal at the RRF's).	Approximately 1.1 million tons of C&D waste (includes some oversized MSW) passing through CT solid waste facilities in FY2004. Actual generation is probably higher due to aggregate generated by C&D waste generated by C&D related activities and waste not passing through a CT solid waste facility.	<u>Demolition waste</u>: Reduce the amount of demolition waste generated by supporting programs such as building preservation. For demolition waste generated maximize the amount of material recovered for reuse or recycling through more effective processing at VRFs or salvage and separation at site of generation. Explore feasibility of renewable/clean energy options and resource recovery for clean demolition wood which cannot be reused. Waste not recycled/composted/reused should be disposed in landfills, preferably lined.
			<u>Construction Waste</u>: Focus efforts on source reduction. Construction waste generated should ideally be separated or salvaged at the site of generation to maximize recovery and reuse of material and the rest should be processed at VRFs which maximize material recovered for reuse or recycling and minimize contamination of materials. Goal is to reuse and recycle as much as possible (metal, non-treated wood, rubble, dry wall, etc); explore options for renewable/ clean energy or burning at in-state resource recovery facilities for that portion remaining. Residue will require disposal at landfills, preferably lined.

Table 4-9
Current and Proposed Management of Certain Wastes

Types of Waste	Current Management	Estimated Generation (Tons per year)	Proposed Management
Highway construction and demolition waste	Reuse as clean fill. Processed for recycling (wood waste, metal, and other). Disposed in BW and MSW landfills.	840,000 tpy (estimate taken from proposed 1999 CT SWMP)	Process most for reuse or recycling. The remaining waste, if not appropriate for waste-to-energy applications, will require disposal at landfills, preferably lined.
Land clearing debris	Chipped for landscaping use or mulch. Very little disposed in CT landfills or RRF's. Some is buried or burned at site of generation.	. <100,000 tpy disposed; . 200,000 tpy chipped or left on site) (estimates taken from proposed 1999 CT SWMP)	Recycle by chipping for reuse (as soil amendment, compost, bulking agent) or clean renewable energy use. Prohibit disposal at landfills (LFs) and eliminate open burning (except after natural disaster).
Oversized MSW	Disposed at BW or MSW landfills, either through directly, transfer stations or VRFs. Small amounts, if reduced in size, are disposed at RRFs. Some limited reuse and recycling.	131,000 tpy (estimate taken from proposed 1999 CT SWMP)	Repair and reuse as much as possible (e.g., furniture). Dispose at RRFs (with volume reduction first, where necessary).

Electronic Wastes

Electronic waste includes computers, printers, televisions, VCRs, telephones and other discarded electronic equipment and, although only a small percentage of the nation's municipal solid-waste stream, it is one of the fastest growing components. Some of these products present a disposal problem not only because they are big and bulky, but because most contain hazardous materials like lead (present in the glass in TVs and computers). There are national and international efforts to require or encourage industry to redesign some of these products to reduce the use of toxic substances in their manufacture and to improve their recyclability at end of life.

Currently there is no comprehensive cost effective mechanism to deal with this type of waste and convenient opportunities for recycling these wastes are not broadly available to the public. Some computer manufacturers offer take-back programs (some involve a fee). In Connecticut, some collection events are held periodically by municipalities and regional resource recovery authorities ("RRRAs"). Usually there is no cost to the resident, but it is an expensive program to offer and the municipality or

RRRA pays for the collection event. Not all residents have access to such programs, and event-type programs are often not convenient for residents. Some Connecticut towns collect electronics at their municipal transfer station or recycling drop-off site; most involve a fee for residents to drop-off their electronics. Because of the cost involved or the inconvenience or simply not being aware, many residents simply stockpile obsolete computers in their homes. Large businesses generally hire computer recyclers directly or lease computers, which may include end-of-life management. Smaller businesses may have difficulty finding proper management outlets. Some electronics are still being disposed along with other MSW – thus being landfilled or processed at RRFs. The toxicity of this material is a concern, as well as the toxicity of the resulting ash.

Another issue has been the manner in which some U.S. recycling programs have managed the processing of these products, often dumping used electronics in developing countries where workers were exposed to hazardous materials and unsafe, unhealthy processing conditions and where hazardous wastes from these products are dumped without health or environmental safeguards.

Over the past three years the CT DEP has engaged in a number of stakeholder discussions on how to best manage this waste stream, both as a part of developing this Solid Waste Management Plan and through other organizations. As part of those discussions, the CT DEP has focused on: (1) how best the burden for recycling of electronics should be borne, whether primarily by consumers, retailers, manufacturers or municipalities; (2) identifying systems that minimize impact to the environment, protect public health and our natural resources, and (3) designing systems that are as cost effective as possible.

In 2006, the Department introduced legislation proposing an electronics recycling program based primarily on producer responsibility. Though there was significant interest and a variety of proposals, agreement could not be reached and this legislation ultimately did not pass.

Household Hazardous Waste (HHW) – Including HHW Containing Mercury

Virtually all households have some HHW which is generally defined as a household waste that is toxic, flammable, reactive or corrosive. Common HHW includes oil based paints, thinners, pool chemicals, pesticides, mercury thermometers, and gasoline. The preferable strategy for dealing with this waste stream is to educate consumers to produce less HHW by substituting environmentally preferable products for products which contain hazardous materials. The CT DEP Pollution Prevention Program has been working to promote the use environmentally preferable cleaning products and other EPP products around the home. HHW that is produced should be properly managed. HHW collection programs provide an opportunity to manage these wastes in an environmentally safe manner. At the present time, Connecticut residents have the following options for disposing of their HHW: permanent HHW facilities (four are sited in-state); one-day events; and disposing of this waste along with MSW (this option is the least preferred). Although collections are available for nearly every resident, and on average, over 30,000 state residents participate in a HHW collection

each year, such collections generally take place between April and November, leaving the public with no environmentally preferable option for managing their HHW in the intervening months.

Conditionally Exempt Small Quantity Generators ("CESQGs") of Hazardous Waste Using HHW Collection Infrastructure: Small businesses are frequently unaware of the responsibilities for managing their hazardous wastes. Many dispose of paints, fluorescent lights, pesticides, and other harmful chemicals in the garbage or by pouring them down the drain. By law, these businesses must make a determination if their wastes are hazardous and are prohibited from disposing of any hazardous wastes in the regular garbage. Contracting with a licensed hazardous waste disposal facility can be expensive for a small business. Changes in the State's solid waste regulations allow many small businesses, known as CESQGs to bring their hazardous waste to HHW collections. However, the towns or regional entities (permanent HHW facilities) are not required to offer collection to a CESQG but they may choose to offer collections. The CT DEP has prepared a fact sheet that outlines the process as to how a CESQG may be able to participate in a HHW collection program.

Waste Products Containing Mercury: Over the past ten years, the CT DEP has been aggressively working towards eliminating mercury as a public health and environmental threat. In the past, the CT DEP held special events to collect mercury-containing devices or elemental mercury; such programs targeted schools, dental offices, medical facilities (e.g., thermometer exchanges) and households (e.g., thermometer exchanges and thermostats). Currently, mercury containing products are now collected at the on-going HHW collections, as well as through producer sponsored collection programs on a product specific basis. In 2002, Connecticut adopted comprehensive mercury reduction legislation and is codified as CGS Sections 22a-612 through 22a-625. The legislation establishes a program to eliminate non-essential uses of mercury in consumer, household and commercial products. The law covers a broad range of topics such as manufacturer's notification, specific product bans, sale restrictions, mercury-containing lamp management, labeling requirements, dental amalgam best management practices, and manufacturer's collection plans. The first provisions of the law were effective July 1, 2002 with full implementation of all requirements by 2013.

Other Types of Special Waste

In addition to the C&D waste, land clearing debris, oversized MSW, electronics waste, and HHW, there are other categories of special wastes that are generated in Connecticut. These include the following:

- **Animal mortalities:** Animal mortalities are generated under different circumstances and in varying quantities. These can be the result of road kills; daily or occasional mortalities of farm animals; catastrophic farm animal mortality; and veterinary animal mortalities. Most animal mortalities are the result of road kill and are managed by CT DOT or municipal road crews. These types of animal mortalities are generally managed by dragging the animal off the road and possibly burying it. Usually road crews are instructed not to bury dead animals too

close to a road, nor to bury it near a wetland. Mass burial of dead animals on CT DOT or municipal property is not recommended. In some states, animal mortalities are routinely composted with other organics. This does not appear to be a common practice in Connecticut. Proper management of animal mortalities in residential areas can be challenging. Large-scale animal mortalities from illness are often managed through RRFs. The animals are euthanized and disposed as special wastes for a higher tipping fee at a resources recovery facility.

- **Road wastes (street sweepings and catch basin cleanings):** Sweeping streets and cleaning catch basins to remove accumulated sediments, trash, and debris reduces the amount of pollutants entering Connecticut's watercourses and waterbodies. Connecticut storm water permits require that municipalities regularly perform these practices to help improve the State's water quality. Street sweepings usually contain low levels of chemical compounds associated with storm water runoff. Catch basin cleanings generally have higher levels of pollutants than street sweepings; the fine grained sediments in catch basins and other drainage structures adsorb more metals and other pollutants than is found in street sweepings. The CT DOT and municipal public works departments are responsible for managing the disposal of material from road wastes generated on their respective roadways. CT DEP's document entitled Guidance for Municipal Management Practices for Street Sweepings and Catch Basin Cleanings outlines best management practices (BMPs) for the use and/or disposal of this type of waste. The actual management of this waste has resulted in some cases where temporary storage sites have stockpiled this waste far in excess of the permitted amount, eventually impacting nearby water resources. In addition, some municipalities have indicated that managing this type of waste material is costly, both for analytical testing and transport of the material to approved disposal facilities.
- **Contaminated soils:** Contaminated soils are typically generated as a result of fuel and chemical spills, leaking oil tanks, industrial accidents, and improper disposal. Contaminants may include any substances that have the potential to pollute air or water. Owners of property containing contaminated soils generally retain a private contractor to clean up the site. Soil contamination varies in degree and is typically handled through one or more of the following options available to responsible parties in Connecticut for managing contaminated soils: remediate it in place; deliver it to an out-of-state facility; dispose of it at an in-state landfill; deliver it to an in-state treatment facility; and reuse it in accordance with the State's Remediation Standard Regulations.
    - Under one or more programs administered by CT DEP, Responsible Parties may remediate soil in accordance with the approval of CT DEP or Licensed Environmental Professionals.
    - Responsible Parties may take contaminated soils to landfills or soils reclamation facilities in neighboring states. Contractors working in areas close to bordering states often take advantage of this option. Anecdotal evidence suggests that a significant fraction of Connecticut's contaminated

soils are handled in this way. However, soils moving out of state are not tracked.

- Three landfills in Connecticut accept contaminated soils, but only with a "Special Waste Disposal Authorization" ("SWDA") from the CT DEP. Although the individual authorizations stipulate the amount that can be disposed, the DEP does not aggregate these amounts for reporting purposes. Tipping fees at Connecticut landfills with a SWDA may range from $60.00 to $80.00 per ton.
- A soil remediation facility is located in Waterbury, CT and charges a tipping fee of approximately $50.00 per ton to treat petroleum contaminated soil.
- Reusing of polluted soil on another site requires testing of the soils and approval of the Commissioner of the CT DEP. The reuse must follow the soil reuse requirements of the State's Remediation Standards Regulations.

- **Dredge Materials:** Dredged materials refer to material removed from both inland and marine waters. The main challenge with inland dredged materials is associated with the removal of dams on rivers and management of sediment from behind the dam which is often contaminated. This material must be managed in a similar way to contaminated soils. The potential volume of marine dredged materials is much more significant. Dredge materials result from dredging operations to deepen harbors and navigation channels and anchorages. There are presently four dredge material disposal sites located in Long Island Sound. In June 2005, EPA issued a final rule that concerns ocean disposal and the designation of dredged material disposal at sites known as Central and Western Long Island Sound. The final rule applies to all federal projects and/or projects greater than 25,000 cubic yards to be disposed at those two sites. This final rule requires that a regional dredged material management plan ("DMMP") for Long Island Sound must be prepared by June 2013 by the Army Corps of Engineers, in consultation with the states of New York and Connecticut and EPA which includes a comprehensive study of disposal alternative. One of the goals of the DMMP process is to evaluate alternatives to open water disposal. Before the disposal of dredged material may be authorized at either of the two sites subject to the rule it must be determined that there are no practicable, environmentally preferable management options available. The types of alternatives that are generally considered include upland disposal (e.g., landfill), beneficial use (e.g., beach nourishment), or sediment treatment technologies that might render the material suitable for other types of uses. At this time, there is no treatment facility designed to treat dredged material with the goal of reusing the material. The implications for future disposal of this material onto upland areas are significant.
- **Sewage Sludge:** Sewage sludge, which is generated by the 111 wastewater treatment plants located in Connecticut, is managed in three ways: small amounts are either shipped out-of-state for management or are composted at one of two composting sites in-state; and the remaining amounts are sent to one of the six sewage sludge incinerators located within Connecticut. These sludge incinerators

produce ash residue that requires disposal. The amount of ash residue that is generated is only reported to the CT DEP if the disposal of that ash occurs within the State and is reported to the CT DEP by the disposal facility receiving the ash, making it difficult to quantify total amounts. In FY 2004, four of the six incinerator facilities shipped the ash residue waste to out-of-state facilities. State regulations do not allow for beneficial reuse of sewage sludge ash residue.

- **Preservative treated wood:** Preservative treated wood is wood treated with chemical preservatives (pesticides) to protect against moisture, rot, and insect damage. It has been widely used for many years in the construction of decks, walkways, fences, gazebos, boat docks and playground equipment. Preservatives used include: creosote; chromated copper arsenate ("CCA"), ammoniacal copper zinc arsenate ("ACZA"), ammoniacal copper quaternary compound ("ACQ"), copper azole ("CA"), sodium borates ("SBX/DOT"), and others. In the past, one of the most common types used was CCA treated lumber. However, it has been found that lumber treated with CCA presents the potential for arsenic to migrate from treated wood into surrounding soil over time and may also be dislodged from the wood surface upon contact with skin. Based on these findings, the U.S. EPA worked with pesticide manufacturers to voluntarily phase out, by December 31, 2003, CCA use for wood products around the home and in children's play areas.

  Even though CCA wood for some applications has been voluntarily phased out of use, structures made of this material still persist. As these and other structures age and are renovated or demolished, CCA and other preservative treated wood will continue entering the waste stream. Since many wood preserving chemicals are toxic, they have the potential to present environmental or health issues when the wood is disposed. The first priority in minimizing the effects of disposal of preservative-treated wood is to dispose less of it by encouraging the continued use of the structures built from it (as long as that doesn't present an environmental or health problems), followed by promoting salvage and reuse of the material in some other structure (as long as that doesn't present an environmental or health problems). Preservative treated wood cannot be used as mulch or for compost because of the potential for leaching of toxic substances. Landscape and architectural design and construction specifications should minimize use of wood in locations where rot or insect infestation is likely and should specify using environmentally preferable alternatives such as recycled plastic lumber, naturally decay resistant woods from certified forests, wood treated with less toxic preservatives, or other alternative building materials such as concrete and stone where possible.

  Disposal of Preservative Treated Wood: Connecticut state statute prohibits open burning of treated lumber and no Connecticut RRF accepts preservative treated wood for disposal. Currently, in Connecticut, the majority of discarded preservative-treated lumber goes to transfer stations or volume reduction facilities and is then transported to out-of-state C&D waste landfills, typically unlined. Recently, some municipal transfer stations have refused to accept preservative-treated wood, apparently due to issues related to potential toxicity.

Until better waste management options are identified, CT DEP recommends that preservative treated wood not be disposed anywhere except a landfill which satisfies the standards for protecting groundwater found in RCRA 40 CFR 258.40 – which means lined landfills. However, as described above, most of the preservative-treated wood in Connecticut's waste stream ends up in unlined landfills, mainly out-of-state but also in Connecticut. The CT DEP needs to assess the feasibility of requiring that waste preservative treated wood only be disposed in lined landfills and will keep abreast of developments regarding alternative environmentally preferable waste management options for preservative treated wood.

- **Sharps and waste pharmaceuticals:** Improperly discarded needles and other sharps may expose workers handling solid waste or recyclables to accidental needle sticks and potential infection when: containers break open inside garbage trucks; containers containing needles are mistakenly sent to recycling facilities; and when loose sharps or needles poke through plastic garbage bags. Most health care facilities have implemented safe disposal management programs for their sharps. However convenient, low cost options for "at-home" users of syringes to safely dispose of their discarded needles need to be developed and publicized in Connecticut. These can include: mail-back programs; at-home needle destruction devices; drop box or supervised collection sites. An emerging issue is the disposal of waste pharmaceuticals. Discussion is beginning on the best mechanism to assure proper disposal of these materials in a manner that is both safe and environmentally sound. CT DEP will be looking to further engage stakeholders in these discussions.

- **Disaster Debris:** The CT DEP has a draft Debris Management Plan that addresses natural and man-made disasters and is currently reviewing and updating it. The purpose of the Plan is to facilitate and coordinate safe and cost effective removal, collection, recycling and disposal of debris following a disaster, to mitigate against any potential threat to the health, safety, and welfare of the impacted citizens, to expedite recovery efforts in the impacted area(s), to maximize recycling and reuse of debris and to address any threat of significant damage to public and private property and to the environment. Natural and man-made disasters precipitate a variety of debris that includes but is not limited to such things as trees, soils and sediments, construction and demolition materials, vehicles, and personal property.

  In a major or catastrophic disaster, municipalities and Connecticut state agencies will be tasked to locate staff, equipment, and funds to devote to debris removal in both the short and long term. Such activities will be reliant upon debris disposal strategies and policies developed by the CT DEP and implemented under the Governor's emergency powers if necessary. The debris management program implemented by State agencies and municipalities will be based on recycling and material separation at the point of generation and at staging/processing locations. The goal will be to maximize potential processing and recycling options. This strategy will be of highest priority and public education together with municipal, state, and federal cooperation will be imperative to effectively carry out this mission.

Strategies for Managing Special Waste and Other Types of Solid Waste

Strategies for C&D Waste

Strategy 4-1. Establish a subcommittee of the Agency Solid Waste Management Advisory Committee to identify opportunities to reuse and recycle building related C&D waste.

The subcommittee will look for ways to: (1) support efforts and programs that reduce the amount of C&D waste generated from building related activities; (2) support efforts and programs to reuse and recycle C&D waste from building related activities; and (3) support the development of recycling markets for separated C&D waste from building related activities. Embracing principals of green building will contribute a great deal towards reducing C&D waste generated and disposed and increasing reuse and recycling of this material. Following are the types of efforts that the subcommittee should evaluate.

- Support efforts and programs that *reduce the amount of C&D waste generated* from building related activities.

  Source reduction is the highest priority for solid waste management and the most environmentally preferable option. For construction projects, source reduction practices can include: the use of composite lumber; architectural design that minimizes wastes (e.g., use of framing techniques and designs that use standard size materials, and modular and prefabricated materials; centralized wood-cutting operations that can contribute to more efficient use of lumber and that can reduce lumber usage by up to 15 percent); renovation of old buildings for reuse; the reuse of salvageable contents from old buildings (e.g., doors, molding, fixtures, masonry, and steel); the minimization of packaging; and constructing buildings that are more durable and adaptable to different uses over time. Opportunities for source reduction should include:

  - Education and partnering with design organizations like the Connecticut Chapter of the American Institute of Architects and the Connecticut Chapter of the American Society of Landscape Architects, and similar chapters for civil engineers, and interior designers, to convince designers to make a commitment to waste prevention in their work.
  - Promotion of economic and zoning incentives to promote building preservation and reuse thereby reducing demolition debris.
  - Education and building code reform (where necessary) to qualify used materials for incorporation into new designs. Building codes should be reformed to rely as much as possible on clear performance objectives or standards, and not on materials standards, and then accept testing results that follow certain approved protocols.
  - Promoting and supporting through education, and other incentives reuse stores and waste exchanges, including on-line waste exchanges that provide opportunities for reuse of salvageable building materials.

- Support efforts and programs to *recycle C&D waste* from building related activities. Improved recycling of C&D waste can result from the following activities:
  - **Promote through education and incentives on-site source separation** and recycling of construction waste and some demolition waste for which markets are identified.
    - CT DEP will work with other state agencies to develop incentives for on-site source separation and recycling of construction waste and some demolition waste (for which markets are identified) on large state-funded projects. Propose legislation that requires the development of waste management plans for large publicly funded demolition and construction projects; the CT DEP will draft model waste management plans that can be used for this purpose. The model could be written to include: (1) for demolition projects, an assessment of whether the structure contains lead or other hazardous components; (2) for construction projects, inclusion of source reduction practices which should be used having them written as specifications in their bid package); (3) for all projects, on-site source separation of materials and identification of waste exchanges, recycling markets, VRFs and appropriate disposal options. The plans for building construction and demolition projects will optimize source reduction and recycling, and ensure appropriate waste disposal. Such a requirement will set an example for private development efforts, encourage development of markets for construction and demolition waste, and decrease the amount of bulky waste requiring disposal in Connecticut.
    - Develop model land use and building regulations that would optimize source separation and recycling of specific waste streams on construction and demolition projects and then work with municipalities to promote voluntary adoption of such regulations.
    - Partner with the CT Green Building Council, the US Green Building Council, the CT Construction Industries Association, and the Construction Institute to provide more education to the design and construction industry regarding the inclusion of source separation of C&D waste as a sustainable building practice and include source separation in construction specifications clearly stating recycling goals, materials to be source-separated/recycled, and planning, reporting, and record keeping requirements.
    - Explore options for requiring source separation of major items such as aggregate materials (brick, block, concrete, stone), scrap metal, treated wood, asphalt roofing shingles, etc. at demolition projects.
  - Improve the effectiveness of C&D waste processing. Volume reduction facilities (VRFs) vary greatly according to the types of waste processed, processing techniques (manual versus mechanical), and the nature of the end processed material. The State needs to promote the development of new C&D

VRFs in Connecticut and/or the improvement of existing C&D VRFs in Connecticut to more effectively sort and process construction and demolition waste in a manner that will minimize contamination of recyclable materials and maximize the quantity of materials that meet standards for reuse and/or specifications for use in recycling markets. This would include the processing of construction and demolition wood to make it suitable for use in clean energy technologies or for incineration at existing RRFs if deemed feasible and appropriate. The CT DEP will work with the appropriate state partners to develop and implement incentives (e.g., low cost loans) to encourage this type of activity. The CT DEP will give priority to those applications in the permit review process to facilities that meet certain criteria that can include but not be limited to the following:

  - Encourage source separation of construction and demolition waste prior to acceptance at VRFs as necessary to maximize recycling;
  - Sort and process construction and demolition waste in a manner that will minimize contamination of recyclable materials and maximize the quantity of reusable and marketable recyclable materials;
  - Process demolition wood to make it suitable for use in clean energy technologies or for incineration at existing RRFs if deemed feasible and appropriate;
  - Minimize the quantity of waste and processing residue requiring landfill disposal; and
  - Meet all statutory and regulatory requirements for the permitting of solid waste facilities.

- Consider banning unprocessed C&D waste from being disposed at Connecticut disposal facilities and from going to Connecticut transfer stations that are transferring C&D waste to disposal facilities.
- Encourage separation of C&D waste at municipal transfer stations by recommending amendments to CGS Section 22a-208a(d) to allow such limited separation without requiring a full permit modification. Such changes could be authorized through a letter of approval, general permit, or minor permit amendment.
- Develop a pilot program with several municipalities around the state to develop a C&D debris recycling ordinance where each building and demolition permit applicant will pay a deposit based on type and size of the applicants' project, that is then refunded based on how much material is recycled or source reduced. Those companies that can verify that a designated percentage of the debris has been recycled or avoided through source reduction techniques will get a full refund.
- Propose legislation to require all new construction and demolition projects over a certain square footage to submit a C&D waste recycling plan as part

of municipal planning and zoning approval applications. The CT DEP will draft a model of such a plan.

- Work with public and private entities to develop collection facilities/transfer stations for segregated recycled gypsum wallboard from construction activities and possibly, in the future from renovation and demolition activities. Look to leverage the work of other jurisdictions such as Massachusetts' program with Gypsum Recycle America.

- Support the development of *recycling markets* for separated C&D waste from building related activities. The following activities will support the development of recycling markets:
  - Appropriate state agencies must identify, develop and promote markets that can economically use separated Connecticut generated C&D waste and must develop partnerships to share and disseminate that C&D waste market information among Connecticut C&D waste stakeholders. Research needs to be conducted for recycling market opportunities for difficult to recycle C&D waste material such as plate glass; gypsum wallboard from demolition projects; and adulterated (treated) wood.
  - The CT DEP will work the appropriate state agencies to propose legislation implementing incentives for the development or expansion of: (1) businesses that recycle C&D waste; (2) businesses that reuse C&D waste or use recycled C&D waste to make new products; and (3) technologies, including clean energy technologies, that reuse or use C&D wastes.
  - CT DEP will propose to amend the Connecticut general statutes to allow for limited temporary demonstrations of technologies to reuse or recycle C&D wastes, without a permit.
  - Encourage CT DOT, municipalities, and the paving industry to adopt or amend specifications for asphalt to allow for the use of asphalt shingles in asphalt used for specific paving jobs.
  - CT DEP will re-examine and, where necessary, amend the process for allowing for the beneficial reuse of categories of source separated and processed C&D waste to make the process more efficient and effective.
  - Appropriate state agencies will examine the ability to provide for financial incentives, tax incentives, other similar activity for buying used construction materials or construction materials made of recycled material, especially for buildings certified as "green" by the LEED rating system or other recognized rating system.
  - CT DEP will work with appropriate state agencies to establish additional specifications for the reuse of salvaged material, use of materials with recycled content, and beneficial use of appropriate wastes on state-funded projects.

Strategy 4-2. Revise the statutory and regulatory definitions of solid wastes and solid waste categories to more accurately reflect the character and management of these wastes.

Current solid waste definitions and categories as imposed by the Connecticut General Statutes and Regulations have become outdated and cause conflict with contemporary waste management practices. This results in confusing information regarding certain waste streams making solid waste management, compliance, tracking, and planning difficult. The DEP will seek legislative and regulatory changes to address these definitional issues.

Strategy 4-3. Manage building related C&D waste, that cannot be reduced, reused, recycled, or composted, in a manner that ensures protection of land, air, and water resources and the public health, in compliance with the State hierarchy for managing solid waste.

For C&D waste that requires disposal the CT DEP seeks to divert such waste from disposal in landfills to use in clean energy technologies or incineration at existing RRFs, if it is deemed appropriate under the pertinent regulatory requirements. For that waste which cannot be used for waste-to-energy, the CT DEP will require that all new Connecticut special waste landfills be lined. These landfills will be designated for the disposal of construction and demolition, and other special waste. C&D waste which has not been separated at the site of generation or processed through a VRF to recover recyclable and reusable material and which has not been volume reduced through chipping or shredding will be banned from disposal at any expansion of an existing landfill or from any new landfill built in Connecticut.

Strategy 4-4. Support reuse and recycling of highway/road C&D waste and dispose of that portion that cannot be reduced, reused, recycled or composted, in a manner that ensures protection of land, air, and water resources and the public health in compliance with the state hierarchy for managing solid waste.

- The CT DEP supports continued processing of highway construction and demolition debris at its site of generation and the reuse of asphalt, masonry, and concrete debris from state and municipal road and will provide priority review of applications for specific types of facilities critical to implementation of this strategy, such as those proposing to process highway construction and demolition waste.
- CT DEP will work with municipalities to develop a model plan or ordinance to explore the possibility of promoting consistency among municipalities regarding permits for concrete crushing facilities so that concrete can be recycled and reused by contractors on location. Few communities in Connecticut allow for small concrete crushing facilities on site. This allows a contractor to take unused concrete and crush it down to be reused. While recognizing this is a local issue, regional sites around the state could be set up to accommodate and encourage concrete recycling.

- CT DEP will recommend that road and highway C&D waste that cannot be reused, recycled, or composted or used in clean energy technologies or incinerated at RRFs to be directed to landfills, preferably lined.

Strategies for Land Clearing Debris

Strategy 4-5. Increase the recycling, composting and beneficial use of land clearing debris.

- CT DEP will seek funding to support continued chipping of land clearing debris by municipal and state facilities. This could include funds for the purchase of wood chipping equipment to be shared by municipalities on a regional basis.
- CT DEP will develop a model plan and promote the amendment of municipal land use regulations to require a plan for proper management of land clearing debris from land development.
- CT DEP will work with the appropriate state agencies to promote the development of markets for recycled organic material, including clean wood chips, by drafting state procurement specifications for recycled organic material and developing a program to require the use in state-funded projects of recycled organic materials from authorized recycling or composting facilities.
- CT DEP, in conjunction with the appropriate partners, will promote the development of large-scale food composting facilities some of which may require clean wood chips or yard waste as a bulking agent.
- Promote the establishment of a web based "clean wood chip exchange" so that those who need chips can locate sources of wood chips and vice versa.
- CT DEP, in conjunction with the appropriate state agencies, will promote appropriate uses and markets for the use of woodchips from land clearing debris.
- CT DEP will re-evaluate its permitting requirements related to land clearing debris; a review will be conducted to determine whether permitting requirements can be reduced for facilities that process this waste and whether oversight of wood grinding operations could be delegated to the municipalities.
- CT DEP will recommend that CGS Section 22a-174(f) be amended to prohibit open burning and CGS Section 22a-208x be amended to prohibit the disposal of land clearing debris at landfills, except in the event of a natural disaster. In all cases land clearing debris would be required to be chipped before being disposed at the landfill.

Strategies for Oversized MSW

Strategy 4-6. Increase the reuse and recycling of oversized MSW.

CT DEP, regional solid waste and recycling entities, and municipalities need to increase the reuse and/or recycling of usable oversized MSW (e.g. furniture, mattresses, pallets, spools, and carpets) by:

- Supporting municipal efforts to promote the reuse of oversized MSW through local swaps located at municipal transfer stations, recycling drop-off facilities, etc.;
- Supporting and promoting the use of material exchanges and other reuse programs such as the Institutional Recycling Network, charitable organizations, pallet reuse programs, consignment shops, etc. to increase the reuse of furniture and other usable oversized items;
- Partnering with groups such as the Product Stewardship Institute to promote producer responsibility for hard to manage oversized MSW such as mattresses;
- Working with Carpet America Recovery Efforts, ("CARE")and/or other regional or national programs and non-governmental organizations to increase the recovery of old carpet for recycling in Connecticut; and
- Explore new technology and options for implementing recycling programs for oversized MSW such as technologies for recycling durable plastic products.

Strategy 4-7. Manage oversized MSW (that cannot be reused or recycled) in a manner that ensures protection of land, air, and water resources and the public health in compliance with the state hierarchy for managing solid waste.

Oversized MSW that cannot be reused or recycled should be deconstructed for use in clean energy technologies (untreated wood portion) and the rest should be disposed, preferably at RRFs (with volume reduction first, if necessary) or disposed in landfills.

Strategies for Electronic Wastes

Strategy 4-8. Seek legislation that provides for recycling of electronic wastes based on a producer responsibility model.

In June 2005, the Connecticut DEP sponsored a public Stakeholder Forum to consider how the State should manage the solid waste generated within the State. At the Forum, recycling/re-use of electronic waste was identified as a priority issue that should be addressed in the near term. Participants at the Forum called for eliminating electronics from landfill and resources recovery facilities and for developing programs involving shared responsibilities amongst producers, consumers, retailers and government to address this issue. There has been considerable debate on national, regional and state levels as to the best approach to resolving the electronic waste management problem. To date, no consensus has been reached to resolve the problem. The CT DEP will seek legislative authority to develop a system for the collection and recycling of electronic waste including: oversight by an electronic products recycling authority charged with assessing and collecting fees from manufacturers of electronic products necessary to cover the cost of developing and implementing such program, including but not limited to collection, recycling, consumer education, and administration. Manufacturers should support such a system proportionate to their market share of electronic products sold in Connecticut or by directly collecting and recycling and equivalent amount. After a program is established, a manufacturer who fails to comply should be prohibited from offering their electronic products for sale in Connecticut and after the system is up and running a disposal ban should take effect. This

approach will provide the greatest flexibility in implementation and benefits from market-driven innovation, while reducing the State's role.

Household Hazardous Waste Strategies

Strategy 4-9. Enhance the statewide Household Hazardous Waste Program.

- Implement strategies listed in the Source Reduction Section of this Chapter to encourage businesses, manufacturers, and consumers to reduce their use of toxic products and to use less toxic alternatives.
- CT DEP will: (1) encourage municipalities to further regionalize HHW programs and allow members of different regions to utilize any regional site; (2) encourage programs to offer collections to small businesses; and (3) will work with municipalities and planning regions, especially those currently not participating consistently in HHW programs, to identify the barriers to HHW collection programs and work towards developing strategies to address the barriers.
- CT DEP will work with retailers and manufacturers to improve HHW management opportunities. CT DEP will develop strategies in which retailers and manufacturers support HHW management efforts in Connecticut. Such strategies include but are not limited to:
  - Encourage manufacturers to develop educational materials explaining proper use (e.g., avoidance of overuse) and management of their products;
  - Encourage manufacturers of low-toxic or non-toxic materials to produce literature or participate in public environmental events, to encourage reduction of the use of household toxics.
- Implement a statewide paint recovery program in conjunction with appropriate state and regional authorities. This program will include working with recycled-content paint manufacturers, major purchasers and end-users of paint to develop and showcase markets for recycled paint products. Latex paint in particular is an attractive pilot opportunity for product stewardship recovery programs, because of the high volume of use and lower handling risks.
- Continue to aggressively implement the Mercury Reduction and Education Act to reduce the prevalence of mercury-added products in the waste stream and promote producer based mercury collection programs. The CT DEP should survey generators of mercury, such as schools and dental offices, to assess the need for mercury-collection events.

Strategies for Other Types of Special Waste

Strategy 4-10. CT DEP will continue to monitor and research management options for other types of special wastes that have not been adequately addressed to date, or as problems and the need arises, and as resources allow. Types of wastes that need to be addressed include: animal mortalities; road wastes; dredge material from Long Island Sound; contaminated soils; sewage sludge;

preservative treated wood; sharps and waste pharmaceuticals; and disaster debris.

- **Animal Mortalities.** CT DEP will develop and disseminate best management practices ("BMPs") for managing animal mortalities. The CT DEP, in consultation with state agencies and municipal officials, will develop BMPs for state agencies and municipalities concerning strategies for small scale animal mortality management. The same BMPs may be applicable in certain situations for daily or occasional farm mortalities, although this sector appears to have acceptable existing practices. In the event of a catastrophic pathogenic mortality event, state and federal health and agricultural agencies will be consulted regarding the appropriate disposal method.
- **Road Wastes (Street Sweepings and Catch Basin Cleanings).** CT DEP will undertake several efforts to address this category of wastes, including the following:
  - Develop a General Permit for the reuse of soil that meets certain criteria for roadbed application/use. Consider including street sweepings under this permit.
  - Encourage and provide technical and financial support to towns to (1) conduct their own studies to determine/characterize this type of waste within their town; (2) seek ways to modify existing practices to minimize application of sand and salt; and (3) evaluate the feasibility of developing regional storage/processing facilities where road wastes can be consolidated and stored for testing and/or reuse and treatment.
- **Dredge material from Long Island Sound.** The CT DMMP for Long Island Sound that is required to be prepared pursuant to EPA's final rule (40 CFR 228) concerning ocean disposal and the designation of dredged material disposal sites in Central and Western Long Island Sound must be prepared by 2013. The Plan will include the identification of alternatives to open-water disposal and the development of procedures and standards for the use of practicable alternatives to open-water disposal.
- **Contaminated soils.** Evaluate and seek appropriate changes to the existing statutory and regulatory requirements for the reuse of soil with lower levels of contamination to encourage its reuse in a manner that is both protective of human health and the environment and minimizes the need for permanent disposal. Develop general permits for the management, handling, and beneficial reuse of contaminated soils.
- **Sewage sludge.** The Department will monitor new technologies for dealing with this waste in an environmentally preferable manner. Currently, there are no reporting requirements for owners or operators of in-state sewage sludge incinerators to report the amount and destination of ash generated by their facilities. The CT DEP will establish reporting requirements for these facilities to report such information to the CT DEP.

- **Preservative treated wood.** The CT DEP will assess the feasibility of requiring that waste preservative treated wood only be disposed in lined landfills and will keep abreast of developments regarding alternative environmentally preferable waste management options for preservative treated wood.
- **Sharps and waste pharmaceuticals.** In Connecticut, there needs to be better management of the collection and disposal of sharps and needles from the home use of medical and veterinary care. The CT DEP will identify and seek partners to assess, evaluate and recommend appropriate management of this type of waste. CT DEP will also begin to engage stakeholders in discussion on the emerging issue of waste pharmaceutical disposal.
- **Disaster Debris.** CT DEP staff are attending workshops hosted by EPA Region I, FEMA and the State of Connecticut's Department of Homeland Security and Emergency Management. The CT DEP's draft Debris Management Plan will be revised according to any new information that the workshops provide.

4.3.5 Objective 5. Education And Outreach

Significantly increase awareness and understanding of waste management needs, impacts and the critical social, economic, and environmental issues facing Connecticut, and build support for programs to engage citizens in actions needed to maximize waste reduction and recycling and minimize the need for additional disposal capacity.

Overview

Connecticut has a mature recycling and source reduction program. The recycling mandate was initiated in 1991 when there were multiple resources available to municipalities, regions and the State to provide education programs. Through the work of a CT DEP Recycling Education Coordinator, the Department was involved in a variety of efforts to educate the public on these issues. For example, the Department provided "template" graphics for all signs and other educational materials that provided for a uniform look to the education campaign. The Department also managed a statewide advertising campaign that provided regular reminders to the public to recycle. The State funded entertaining presentations on recycling for schools by Connecticut's recycling superhero, Ray Cycle. State grant funds were also available to cover the creation of educational materials, workshops, etc., and the participation by municipalities and regions was high.

Over the last several years, recycling education efforts at the local, regional and State levels have diminished greatly. The CT DEP no longer has a Recycling Education Coordinator and does not provide any recycling education funding to towns. Very few municipalities have a dedicated staff person to manage their local recycling programs. As a result, local recycling education efforts have suffered and the number of messages that people receive to recycle has been dramatically reduced. There are few municipalities that actively educate their residents about recycling.

Due to the changes in the amount of recycling information given locally, and the differences between municipalities with regard to what recycling messages get to their residents, market research would help to determine the best way to reach a statewide recycling and source reduction audience. The public education methods used in 1991 may no longer be appropriate and resources currently available are limited, so it is important to target messages as much as is possible.

Current Education and Outreach Practices

A wide range of education and outreach efforts have been undertaken in Connecticut by the CT DEP, CRRA, other regional waste authorities, and local and regional government agencies. Additionally, the CT DEP and other organizations have sought to compile materials and resources from other states and to make them freely available in Connecticut. However, due to decreasing staff and resources at all levels, these programs are not as effective as they could be. Current recycling education resources include:

- The CT DEP recycling web site which contains information on Connecticut's waste management programs, regulations and related topics; source reduction, recycling and composting fact sheets, brochures and posters; videos and audio visual resources; K-12 educational materials; resources and information on pollution prevention and source reduction, including fact sheets, case studies; and technical information on green building, pollution prevention, and tips for greener home purchases.
- The CRRA operates two museums: the Visitors Center & Trash Museum in Hartford and the Children's Garbage Museum in Stratford. Each museum has a viewing area where visitors can observe the working regional recycling center and get other information on recycling. Approximately 50,000 people of all ages visit the museums each year. CRRA also has books and videos about solid waste and recycling topics available to borrow as well as curriculum and loan kits. In addition, CRRA representatives are available to speak at community events and group meetings about solid waste and recycling issues. CRRA has one full-time and five part-time educators on staff.
- The Southeastern Connecticut Regional Resource Recovery Authority ("SCRRRA") runs a successful recycling education center located at the Groton IPC. This facility provides recycling and solid waste education to area schools and civic groups. Education outreach is available either at the Education Center or, upon request, at area schools. Similar to the Hartford facility, albeit on a smaller scale, demonstrations and viewing of the working IPC are available.
- The Tunxis recycling Operating Committee (TROC), the Housatonic Resources Recovery Authority ("HRRA"), and some Connecticut municipalities also are involved in a range of education and outreach efforts. TROC and HRRA have each developed an excellent website for residents to access. In 2006, TROC shared with DEP and other regional recycling programs, the results of their new market research effort to better understand factors influencing recycling among its residents and identify areas where key improvements need to be made in order to

increase recycling participation. The City of Hartford, for example, provides a six-page, comprehensive printed guide to recycling opportunities and regulations, downloadable from its web site.

- A review of the web sites of recycling regions and the fifteen largest Connecticut municipalities showed that only two regions have recycling web sites and generally, municipal recycling education is lacking beyond basic information about the types of materials to be recycled curbside and how to prepare them. Very few web sites stress the reasons to recycle or the benefits of recycling. Most mention that recycling is mandatory.

Barriers to Effective Education and Outreach Efforts

Current education and outreach efforts in Connecticut suffer from several shortcomings. These shortcomings stem from the lack of resources, both funding and staff, to support solid waste education programs and include:

- No centralized, comprehensive way to access all materials;
- Some materials are out of date or in need of revision to refresh their message and approach;
- Lack of a coordinated strategy regarding top priority messages, target audiences, desired outcomes or approaches;
- A large number of uncoordinated web sites, often incorporated within the main web site of government agencies or other large organizations, that can be difficult to find and cumbersome to use;
- No resources for statewide media messaging and apparently very little media messaging at the local level;
- Few efforts targeting education at the college and university levels, or for professionals working in the solid waste management or recycling fields in Connecticut; and
- Lack of a consistent and identifiable message concerning source reduction, recycling or other waste management related issues in Connecticut.

Education and Outreach Opportunities and Priorities

There are many opportunities to strengthen education and outreach efforts, each involving varying commitments of additional funding and resources. Connecticut's top priorities for education and outreach are to promote:

- General awareness of Connecticut's disposal capacity shortfall and how increased source reduction, recycling and composting will help address this issue;
- Greater understanding of the environmental and economic benefits of source reduction, recycling and composting; and
- Greater understanding and motivation to participate in local waste diversion programs.

Strategies

Strategy 5-1. Undertake Education and Outreach Actions Using Minimal Additional Resources. Such actions could include: coordinating existing resources and sharing information; enhancing the CT DEP website; promoting awareness through recognition programs; integrating solid waste issues with other environmental issues; ongoing outreach to media; and encouraging municipalities to provide solid waste and recycling information to residents and businesses.

At a minimum, the following actions should be taken to improve solid waste education statewide using additional staff time from existing resources (some municipal and regional recycling coordinators, CRRA, some CT DEP staff time):

- Convene a group of existing providers to coordinate existing educational resources. Insert hotlinks on the existing recycling websites of the CT DEP, CRRA and their museums, TROC and HRRA, and municipal web sites to connect resources and information. Links should also be provided on web sites of related environmental issues, such as climate change, environmental purchasing, others.
- Expand and enhance the CT DEP internet site concerning waste management topics.
- Continue to use existing awards and recognition programs to promote awareness and recognize and support exemplary source reduction and recycling actions of businesses and other groups. Such actions are currently eligible for recognition through two established CT DEP recognition award programs (Connecticut Municipal Recycling Honor Roll, Green Circle Program) and the Connecticut Climate Change Leadership Awards Program.
- Incorporate recycling education into existing outreach on related issues. The State's outreach material and events on the Connecticut Climate Change Action Plan 2005 includes information on recycling. Other environmental education and outreach programs should also promote recycling. Incorporating the message into broad environmental outreach is both an efficient and effective way to reinvigorate recycling awareness.
- Catalog and disseminate information among providers regarding best practices that have shown results at the local or regional level.
- Develop on-going outreach to the media to encourage articles/distribute press kits outlining benefits of source reduction and recycling in Connecticut.
- There are many education and outreach activities that could be undertaken at the local level that can significantly bring about increased recycling and composting participation by municipal staff, the residents and business. Municipal government can add to their routine mailings to residents educational information or notices regarding town solid waste management issues (e.g., mandated items to be recycled; HHW hours of operation; special waste pick-ups, the actual cost of disposal of residential MSW, other topics); post/display notices and/or handout

notices to residents and commercial users at municipal transfer stations; encourage awareness and action regarding source reduction and recycling at town offices, buildings and functions.

Strategy 5-2. Undertake Education and Outreach Actions Using Additional Resources. These actions can include: provide comprehensive assistance to regional and local outreach programs; develop partnerships; and assess and modify outreach programs on a two year basis.

With adequate funding, the following initiatives would also increase awareness and participation in waste diversion programs:

- Provide funding, materials, coordination assistance and support to regional and local education and outreach programs. Support local programs by providing funding and assistance to both regional entities and, where strong regional programs do not exist, by directly supporting local government programs. Establish a statewide recycling education coordinator and program to build institutional capacity on education and outreach approaches at the State and local levels and to secure partnerships with other states, trade associations, and agencies. The statewide education program will be coordinated and implemented from a single location, with a qualified staff and ample resources. The coordinator will solicit proposals from other groups to carry out certain program projects and activities. Among others, these groups may include the CT DEP, CRRA, university departments or non-profit organizations, possibly in partnership with one or more private public relations firms. The recycling education coordinator, will work to build partnerships (e.g., with other states, U.S. EPA, trade associations, NGOs, others) to build institutional capacity for education and outreach by regional organizations and local governments, especially to enable their adaptation and use of state education resources and efforts to increase consistency among local programs and approaches. Local and regional parties will also be program partners. Support grant funding to municipalities to promote recycling.
- Partner with existing organizations and educational centers. The Department will investigate opportunities for partnering with the new Connecticut Science Center. Connecticut can seek to secure funding and partners to support an ongoing statewide and local education and outreach campaign, to promote and support closely aligned local efforts. Given the high level of interest in reinvigorating recycling by the U.S. EPA, other states, trade associations, product producers, retail stores and others, there are numerous opportunities for partnering.
- Measure progress, update and refine education and outreach approaches at least every two years. Measuring progress in education and outreach programs is difficult. However, it is essential to make determinations about what is working and what needs to be refined.

Strategy 5-3. Undertake Education and Outreach Actions Using Expanded Resources. These actions can include: research and develop effective outreach approaches; disseminate new educational and outreach materials; develop an independent recycling web site that acts as a clearinghouse and listserve for municipal and regional recycling coordinators; and develop education and technical assistance for targeted sectors.

With significant funding, a comprehensive education program could include:

- Conducting research (including surveys and focus groups) and evaluate existing materials to determine the most effective targets of an education and outreach program, including desired outcomes, target audiences, messages and approaches. An effective education and outreach program will use research as a basis for justifying expected outcomes, identifying target audiences, and developing messages and outreach approaches tailored to achieve those outcomes. This program design should be reviewed and refined periodically.
- Based on the research, develop and disseminate new educational and outreach materials and/or repackage and adapt existing ones, with an eye towards promoting statewide consistency. An overriding goal of these efforts is to encourage use of consistent materials and messages (and actual program design) across Connecticut towns and regions, with the ability to adapt them to local program needs. Connecticut will also strongly encourage and support the use of existing materials and campaigns that further its goals, in addition to the State's program.
- Develop an independent web site that acts as a clearinghouse for recycling information and resources in Connecticut. The web site will be based on research results and augment and link to existing educational resources. The website can also include a list serve for municipal and regional recycling coordinators to share information on the effectiveness of source reduction and recycling programs.
- Develop targeted education programs for small businesses and other sectors without effective recycling programs.

4.3.6 Objective 6. Program Planning, Evaluation and Measurement

Enhance local, regional, and state program measurement, evaluation and planning practices to drive continual progress towards achieving Connecticut's waste management goals.

Overview of Program Planning, Evaluation and Measurement

Solid waste data collection and analysis and solid waste program planning and evaluation are intricately related. However the demands of each are distinct. and in this section, program planning and evaluation will be discussed separately from program measurement.

Planning and Evaluation Overview

Program planning and evaluation are essential elements of Connecticut's approach to achieving its solid waste management objectives, and especially to achieving its aggressive waste diversion targets. Program planning and evaluation ensures that Connecticut's solid waste management activities adapt over time to changing conditions and are continually improved to maximize effectiveness and efficiency. Planning is essential to ensure that overall local, regional, and state systems stay on track and are designed to achieve clear objectives, tied to the State's goals and long-term vision. Good planning is an iterative process fed by accurate data that is carefully evaluated and re-evaluated. The outcome of changes to any system must be monitored for and corrected to achieve the stated goal.

Measurement Overview

Effective solid waste management requires comprehensive and accurate solid waste data for:

- Solid waste projections and related planning and program evaluation - to help decision makers plan at all levels;
- Assurance of compliance with solid waste statutes, regulations, and permit requirements;
- Measurement of progress towards solid waste management goals and calculation of environmental benefits associated with those goals. Measurement of progress is an essential element of Connecticut's approach to achieving its solid waste management objectives, and especially to achieving its aggressive waste diversion targets. Data and information are needed to measure progress towards local, regional and state objectives; and
- Business decisions regarding location in the State or region of: solid waste or recycling processing facilities; solid waste disposal facilities; solid waste transfer stations; and manufacturing facilities using recycled material as a feedstock.

The CT DEP will revise and enhance the solid waste reporting and measuring system to eliminate duplicative reporting requirements and reduce the reporting burden, while ensuring that the information most needed to plan, implement and track performance is widely available.

Current Planning, Evaluation, and Measurement Practices

Current Planning and Evaluation Practices

This section provides a brief synopsis of Connecticut's program planning and evaluation system.

Connecticut's integrated waste management planning at the local, regional, and state levels is in need of revision and reinvigoration. The last formally adopted statewide solid waste management plan was prepared in 1991. Under the regulations adopted pursuant to CGS section 22a-228, the Commissioner may amend the statewide solid

waste management plan as needed and formally adopt such amendments on a regular basis. A draft revised plan prepared in 1999 included a thorough assessment of the State's system and many recommendations, but it was never formally adopted. Because of this long time lag, this statewide Plan examines a different state of affairs in waste management today and must plan for the ongoing evolution of Connecticut's waste management system.

While, at the local level, prior to the adoption of the statewide plan, municipalities were once required to prepare their own solid waste management plans, no such plans have been prepared since the 1980's. However the need for local planning and coordination to assure the proper management of their solid wastes still remains. CGS Section 22a- 220 requires municipalities to make provision for the disposal of solid waste generated within their borders and to provide recycling services for mandated recyclables. This obligation taken in conjunction with the changes in waste management options, the evolving structure of the industry and the need to increase diversion will only make coordinating local needs with regional and state planning more important.

At the regional level, a system of regional recycling programs and operating committees was formed in the early 1990s to assist member municipalities with recycling contracting and education. Grant funds were originally provided to assist the regions and their member municipalities in developing recycling programs and establishing and contracting with regional intermediate processing facilities. State grant funds also supported regional recycling coordinators. However, in recent years many regional programs have ceased or curtailed their recycling activities and state funding for these purposes has run out.

Common across all levels, state, regional, and local, is a lack of ongoing evaluation of the outcomes. Challenges with maintaining an up to date picture of the waste flow throughout the waste management system in Connecticut and a lack of resources dedicated to evaluating the effects of changes in that system have left an incomplete picture of waste management in Connecticut. The extended length of time between comprehensive reevaluations prevents or limits the timely change needed to keep the system fully functional.

Current Measurement Practices

This section provides a brief synopsis of Connecticut's program reporting system. The State's data reporting requirements are described and assessed in detail in Appendix B.

Prior to 1990, it was difficult to track total solid waste generated in Connecticut because much of Connecticut's solid waste was disposed in municipal landfills, many of which had no scales to measure waste. Starting in the mid-to-late 1980's CT DEP started tracking MSW disposed in Connecticut's resource recovery facilities and in some Connecticut landfills. In the early 1990s, the Department developed a comprehensive solid waste reporting system and computerized data base to track solid waste generation and management in the State. The accuracy of solid waste data, especially for MSW, has increased over the past decade as more solid waste is disposed of through Connecticut permitted solid waste facilities that submit solid

waste reports to the CT DEP. As a result, the Department is now able to plan much more accurately for the State's solid waste management needs. The CT DEP also participates in regional and national efforts to track MSW imports and exports among the states.

Connecticut state statutes, regulations, and solid waste permits require municipalities, some scrap metal processors, and owners or operators of: solid waste disposal facilities (landfills and resource recovery facilities), solid waste transfer stations, recycling facilities, and C&D volume reduction facilities to report solid waste and recycling data to the Department. The data is generally submitted on forms developed by the Department and include information about the type, origin, amount, and destination of waste received and processed.

The Department maintains most of the reported solid waste and recycling data in its computerized database. The data base is designed to track Connecticut solid waste generated, recycled, and disposed, and can aggregate data by town, region, and statewide for different categories of waste and recyclables. Data on MSW and different types of special waste (ash residue and bulky waste such as construction and demolition wastes) are kept discrete.

Although there are issues with regard to the completeness of MSW captured through the solid waste reporting system (e.g. MSW not delivered to a permitted solid waste facility is not captured; reporting for MSW recycling is incomplete – since it does not include bottle bill material, lead acid storage batteries recycled through the deposit system, or complete commercial recycling tonnages, etc.), the MSW data does allow for estimates adequate for statewide planning purposes. (It needs to be noted that as more of Connecticut's MSW gets disposed out-of-state, tracking that information may become more difficult.) Accurate or complete MSW disposal and recycling data for individual municipalities is more elusive. Some solid waste facilities misidentify the origin of waste received at their facilities; this is in part due to inaccurate information from delivering haulers or to facility reports based on their billing system in lieu of CT DEP reporting requirements. This has made it more difficult, in some instances, to accurately track the flow of waste and recyclables and thus quantify such waste by municipality.

Data regarding resource recovery ash residue disposal are also adequate for planning purposes. However, C&D waste reporting is more incomplete and does not provide a complete picture of C&D waste management in Connecticut.

In addition to the issues mentioned above such as waste not captured by the current solid waste reporting system and occasional inaccurate solid waste facility reporting regarding the origin of waste received, there are other problems with the current solid waste reporting system. These include (1) reluctance of some haulers and facilities to divulge the origin or destination of waste (concerns regarding confidentiality have been expressed by some); (2) checks and balances designed into the original database system result in duplicative reporting by municipalities and solid waste facilities for some disposal and recycling data; (3) some municipalities and solid waste facilities perceive reporting requirements to be unduly burdensome; and (4) the CT DEP has not had a full time solid waste data entry position since 2003.

The CT DEP has used the reported solid waste data for some of the following purposes to:

- Track the State and municipal recycling, disposal and generation rates;
- Identify in-state disposal capacity issues;
- Calculate the environmental benefits resulting from the recycling of specific material types;
- Share with other states looking at MSW import and export issues;
- Identify solid waste management needs;
- Track the success of Connecticut's recycling efforts and help identify recycling marketing issues;
- Track solid waste facility compliance with permit requirements;
- Help decide capacity for new solid waste facility permitting and for permitting expansions at existing solid waste facilities;
- Provide data to recycling processors, brokers, and manufactures looking for sources of specific recycled materials for feedstock for paper mills and for other manufacturing processes; and
- Use as one of the criteria for naming a municipality to the Connecticut Municipal Recycling Honor Roll which is posted on the CT DEP website.

Although the CT DEP has not published the municipal solid waste and recycling information on the CT DEP website, in the past, the CT DEP annually sent out recycling reports to each municipality. These reports provided the following information: (1) their per-capita MSW recycling and disposal rate; (2) total tonnages of MSW disposed and recycled by each town and for the state as a whole; (3) graphs comparing each town's MSW per-capita recycling rates for different materials to other towns with similar populations; (4) graph showing the town's annual per-capita recycling rate for the past five years; and (5) other pertinent recycling, generation, and disposal data. February 2004 was the last time the CT DEP sent out those reports (based on FY2002 data) to the individual towns. Some municipalities have told the CT DEP they use the data to track and evaluate the success of their recycling programs and to track destinations and amounts of MSW generated in their town and disposed. Although the CT DEP has used that data to recognize towns with exemplary recycling programs, the CT DEP has never used that data to enforce against or offer assistance to a town not meeting mandated recycling obligations.

Barriers to Enhanced Planning, Evaluation, and Measurement

Barriers to Planning and Evaluation

Some of the barriers to providing adequate planning and evaluation include:

- The cost, lengthy process and complexity of updating state and local plans;

- A lack of up-to-date, comprehensive data on some of Connecticut's solid waste flows;
- A decline of support to some of the regional recycling operating committees which once provided a foundation for regional cooperation;
- The diminishing over time of recycling support provided to member towns by some of Connecticut's regional planning entities;
- An overall lack of funding and staff resources for program planning and evaluation;
- The lack of clear goals at the local level also contributes to a lack of innovation and program expansion or improvement over time; and
- Opposition to unfunded mandates placed on local governments.

Barriers to Enhanced Measurement

Some of the barriers to enhancing local, regional and state program measurement include:

- A lack of funding and staff resources for data collection, program measurement and evaluation;
- Scale software at solid waste facilities designed for billing purposes – but not amended to also comply with DEP reporting requirements;
- Recycling and solid waste reporting not a priority for municipalities;
- The difficulty of documenting recycling flows due to the many players involved and sensitivity over reporting potentially proprietary, business sensitive information to government agencies and/or solid waste facilities; and
- Difficulty in getting data on solid waste not captured by the current reporting system i.e. waste disposed or recycled without passing through a Connecticut permitted solid waste facility.

Opportunities, Priorities, and Strategies for Planning, Evaluation and Measurement

Opportunities and Priorities for Planning and Evaluation

Connecticut must improve its solid waste planning and evaluation system in order to:

- Establish an iterative planning process based on a comprehensive picture of Connecticut's waste management system;
- Reinvigorate regional cooperation where it makes political and economic sense;
- Establish municipal and regional goals and planning requirements that will drive continual progress, and explore ways of ensuring that the State has adequate resources to provide assistance and to review, approve and compile information from the plans;

- Develop a system for establishing benchmarks based on best practices demonstrated across the state, and a system for sharing this information with all municipalities and regional districts; and
- Explore reducing the burden on municipalities by transferring a portion of responsibility for planning and education and outreach to regional entities.

Opportunities and Priorities for Measurement

Connecticut must improve its solid waste reporting system in order to:

- Establish a means to obtain solid waste data through reporting requirements that are less burdensome and less duplicative for reporting entities but still provides information needed for: solid waste management planning and evaluation, assessment of environmental and economic benefits of recycling and source reduction; and private investment in recycling, composting, or reuse businesses.
- Establishing municipal and regional disposal reduction goals that are less burdensome to accurately track and which will require more relevant reporting and measurement.

Strategies for Planning, Evaluation and Measurement

Following are the strategies Connecticut should pursue to strengthen its program planning and evaluation and measurement for solid waste management.

Strategy 6-1. Establish per capita waste disposal minimization goals for MSW and C&D waste/Oversized MSW.

Since MSW disposal data is generally more complete, accurate, and easier to track than MSW source reduction and recycling data, the goals for minimizing disposal through source reduction, recycling, composting will be expressed as per capita disposal rates rather than percent source reduction/recycling goals. This will require changes to CGS 22a-220(f) which establishes percent source reduction and recycling goals to MSW per capita waste disposal minimization goals. For example, the per-capita MSW disposal minimization goal that would maintain through FY2024 the current annual amount of MSW requiring disposal would reduce the current (FY2005) disposal rate of 0.76 tons/person/year to 0.73 tons/person/year by the year FY2024 (achieving a 49 percent recycling/source reduction rate). For C&D waste and oversized MSW, the goal will be to reduce the tonnage requiring disposal – but since data for this waste stream is incomplete no numerical goal will be established at this time. The CT DEP will continue to track MSW and C&D waste recycling rates and will continue calculating generation rates as well.

Strategy 6-2. Minimize the reporting burden for municipalities and others by only requiring the collection of data necessary to support the goals of the Plan and provide the information needed for on-going solid waste management planning and evaluation.

Focus on getting more accurate solid waste disposal data statewide and for each municipality. Amend the annual municipal and quarterly solid waste facility reporting requirements to: (a) eliminate duplicative reporting by municipalities in their annual municipal recycling reports; eliminate requirement for solid waste and recycling facilities to report duplicative information to both the CT DEP and to municipalities; (b) require more meaningful municipal reporting of efforts to reduce waste generation and disposal through its recycling programs and services, and identification of needs; and (c) require haulers to report to the CT DEP on waste or recyclables not delivered to a reporting solid waste facility.

To help assess the effectiveness of recycling /composting and source reduction efforts, waste disposal characterization assessments should be conducted as necessary to evaluate municipal efforts and success in promoting and enforcing local recycling requirements.

Under this strategy, the CT DEP will still require annual recycling reports from municipalities, but the information required will eliminate the duplicative and often burdensome reporting currently required by the municipalities. The success of this strategy is dependent upon:

- The accurate reporting by haulers when delivering MSW or recyclables to a permitted solid waste facility (i.e. the origin of the MSW or recyclables they deliver - by town or regional solid waste facility of origin);
- The accurate reporting of this information to the CT DEP in the quarterly reports submitted to the CT DEP by the solid waste facilities; and
- The reporting to the CT DEP by haulers regarding Connecticut solid waste directly hauled to either out-of-state facilities or to end markets within Connecticut without first passing through a Connecticut permitted solid waste facility.

Annual Municipal Recycling Report – Eliminate Duplicative Reporting

An electronic reporting form will be developed and the annual municipal recycling reports will no longer ask for data regarding solid waste and recyclables delivered to reporting Connecticut solid waste facilities. Instead the annual municipal recycling reports will be required to provide:

- The tonnage data for solid waste and recyclables managed at a non-reporting municipal site or directly hauled by the municipality or by a municipally contracted hauler to a non-reporting destination (e.g., waste oil; leaves or yard waste composted at a municipal composting site; paper delivered directly to a paper mill by the municipality without first going to a recycling processing facility; solid waste hauled directly to an out-of-state disposal facility etc.). (In order to get complete data, CT DEP will

require haulers to report to the CT DEP any other solid waste they deliver directly from the point of generation to a non-reporting destination).

- Information on the types of programs and practices being employed at the local level to promote and enforce recycling requirements and promote source reduction.
- Information on where haulers registered in the town are hauling the town generated MSW and recyclables. Haulers delivering recyclables or solid waste directly from the point of generation to a non-reporting destination will need to provide data directly to the CT DEP (e.g. amount and type of waste, town of origin, where waste or recyclable was delivered).

Towns in conjunction with the CT DEP, regional solid waste authorities, and solid waste disposal facilities and transfer stations will conduct periodic waste disposal characterization studies to help assess success of municipal recycling efforts and identify areas that need improvement.

Solid Waste Facility Reports – Eliminate Duplicative Reporting re Reports to Municipalities

The CT DEP will amend reporting requirements so that solid waste facilities (i.e. landfills, resource recovery facilities, and recycling facilities processing recyclables listed in CSG 22a-208e(c)) will no longer be required to report MSW tonnages to each municipality. These solid waste facilities will be required to report solely to the CT DEP and the CT DEP will aggregate the data and provide the information to the municipalities. The CT DEP will provide educational outreach to owners and operators of reporting facilities to assure accuracy of data reported.

Obtaining Additional Recycling Data

The CT DEP will explore options for obtaining data or estimates of unreported recyclables (e.g., bottle bill containers, lead acid batteries recycled through the deposit law, waste oil quantities recycled by automotive repair shops, scrap metal, recyclables backhauled to out-of-state retail distribution centers; other commercial recyclables).

These changes to Connecticut's current reporting system and goals (from a percent recycled goal to a goal of reducing the MSW per-capita waste disposal rate and reducing the tons of C&D waste requiring disposal) will strike a more efficient balance between the need for data and information, and the cost and burden associated with obtaining, compiling and reporting it. This statewide goal system will effectively drive efforts to both minimize the amount of waste requiring disposal, help determine disposal capacity expansion needs and provide a framework for increasing source reduction, reuse, recycling and composting.

Strategy 6-3. Establish a standing Solid Waste Advisory Committee of affected stakeholders to help implement the new plan, revise the plan, identify emerging issues and find solutions.

The External Stakeholders group was a critical component of the development of this Plan. Further refinement of these strategies and identification of other solutions to these problems and issues will require continuing dialogue with stakeholders and other interested parties, including the general public.

Strategy 6-4. Implement an iterative planning process for the State's Solid Waste Management Plan to allow revisions on a more frequent and as needed basis following the management system Plan/Do/Check/Act/ model. A strong on-going stakeholder process, local and regional planning, and an improved methodology for measuring success will inform the planning cycle.

Strategy 6-5. Evaluate and make recommendations for changes to underlying legal authorities to improve state, regional, and local solid waste planning and coordination. Develop system performance benchmarks relevant at both the state and local level aimed at achieving a unified solid waste management vision. Explore opportunities to fund planning activities at the state, regional, and local level; and, develop incentives for full participation.

Strategy 6-6. Provide training and informational materials to municipal officials, regional and local waste management and recycling staff regarding best practices and strategies for strengthening solid waste and recycling programs. Encourage communities and regional recycling programs to share their best practices and strategies. Investigate the possibility of establishing a municipal solid waste/recycling mentor program.

- Encourage regional and local recycling programs to share recycling and other solid waste planning information. Explore possibility of establishing a list serve for regional and local recycling coordinators.
- To assist regional entities and municipalities in planning and implementing waste reduction and diversion and other integrated waste management programs, pending availability of funding, DEP will offer training for local staff and elected officials. Initial training will be based on explaining benchmarks for high performance programs and in accessing other technical or financial assistance as proposed in this Plan.
- Provide each municipality and recycling region with an annual assessment of their recycling/source reduction program. Use revised recycling and disposal data to evaluate effectiveness of existing recycling source reduction efforts; devise a system to reward municipalities which have effective recycling programs and provide incentives to maintain and increase their waste disposal reduction efforts; identify municipalities which are not providing adequate recycling promotion

and/or enforcement and offer technical assistance and, if indicated, disincentives for continually failing to fulfill their recycling/composting responsibilities.

- Annually report on the status of Connecticut solid waste management and provide, on the DEP website, state wide and municipal data on solid waste generation, disposal, and recycling/composting.

4.3.7 Objective 7. Permitting and Enforcement

Ensure that permitting and enforcement decisions promote the goals of the Plan and are made in a manner that is fully protective of human health and the environment; promote continuous improvement of the environmental permit application review and decision making process; achieve the highest level of environmental compliance through predictable, timely, and consistent enforcement and effective compliance assistance where appropriate; and improve communication with municipalities, business, industry, and the public on the regulatory process in order to assure compliance with environmental requirements.

Overview of Permitting and Enforcement

In keeping with those objectives, the CT DEP must: (1) improve the solid waste permit application review and decision making process to support the waste management goals of this Plan, especially those relating to increased waste diversion through increased source reduction, recycling, and composting and (2) achieve the highest level of environmental compliance, especially for recycling and composting requirements, through predictable, timely and consistent enforcement and effective compliance assistance where appropriate.

Most of the solution to the solid waste problem in Connecticut will be found in efforts to increase the amount of waste diverted from the waste disposal stream through increased source reduction, recycling, and composting. CT DEP's permitting and enforcement policies will play important roles in helping to maximize effective recycling and composting. The traditional areas of permitting and enforcement will need to be assessed and if necessary amended so that they support the goals of the Plan while ensuring that solid waste is managed in a lawful manner that is protective of public health and the environment. Recognizing this, the Department must devote additional resources and give higher priority to permitting of recycling and composting facilities and beneficial uses of wastes and enforcement that supports increased recycling and other waste diversion activities. Overall, more resources must be devoted to enforcement to send the message that compliance with recycling laws and diversion requirements is a critical component of waste reduction and thereby eliminating any business advantage that could stem from non-compliance. Steps must be taken to streamline the procedures for permitting facilities that are needed to increase the diversion of waste. Increased enforcement resources should be directed toward enforcement of the state's recycling laws as a very high priority, not as secondary priority violations as described in the Department's Enforcement Response Policy.

Current Practices/Barriers – Permitting and Enforcement

Permitting

There are approximately 200 solid waste handling and disposal facilities under individual permits and 81 recycling facilities under general permits in Connecticut, in the categories as listed below. With regard to the individual permits, the CT DEP receives an average of 40 individual applications each year and has been able to process a comparable number. Application fees for individual permits range from $7,500 for a small transfer station to $138,000 for a resource recovery facility, with annual fees from $600 for a transfer station to $4,125 for a RRF. Recycling general permit fees range from $100 to $500.

Listing of the type and number of solid waste Individual Permitted Facilities and the type and number of Recycling General Permitted Facilities as of June 2006:

Individual Permitted Facilities

- 6 MSW RRFs
- 1 Incinerator for Tires
- 32 Landfills
- 1 Vertical Expansion Landfill
- 2 Ash landfills
- 116 Transfer stations
- 27 Volume Reduction Facilities
- 6 Intermediate Processing Facilities
- 2 Composting Facilities
- 5 Household Hazardous Waste Permanent Facilities.
- 2 Recycling Facilities

Recycling General Permits

- 23 Drop-site facilities
- 15 Recyclables transfer facilities
- 9 Limited processing recycling facilities
- 34 Single item recycling facilities
- N/A Satellite drop-site facilities (facilities do not need to register with the CT DEP)

The Solid Waste Program of the Department has only in the last few years been able to begin recovering from the loss of one third or more of its staff. Recent staff additions, along with significant improvements in its processing of applications over

the last three years, has allowed the program to show a steady increase in the number of permit decisions over that time.

One of the most significant problems of the solid waste permitting and enforcement program is that its legal underpinnings are old and in need of updating. The core solid waste statutes date from the 1960s, when the predominant means of disposal was by landfilling. Most towns had their own landfills, and waste from each town was trucked directly from the generator to the landfill; there was little or no need for transfer stations or volume reduction facilities. Statutory and regulatory amendments over the years were focused on resolving specific issues, and there were limited attempts to make comprehensive improvements to the statutes and regulations. This has resulted in statutes and regulations that are difficult to comprehend, interpret and enforce, and that are contradictory in places. A major rewrite of the solid waste statutes and regulations is needed.

The Department has historically assigned all applications the same priority regardless of how beneficial the proposed facility may be in helping to meet the goals of the Solid Waste Plan. Hence, applications for beneficial uses of wastes and for individual recycling facility permits have been processed with all other types of solid waste permits, and the resulting lengthy turnaround time has functioned as a disincentive to potential applicants for new beneficial use activities. Although general permits were developed for some types of recycling activities (thereby facilitating the approval of such recycling activities), the CT DEP has not developed general permits for other solid waste activities, thus losing an opportunity to more expeditiously approve certain waste activities.

In addition to facility permitting requirements, the CT DEP requires that waste haulers be permitted for the following activities: hazardous wastes, industrial liquids and biomedical wastes. However, haulers carrying solid waste and recyclables are not required to be permitted by the CT DEP. The only comparable requirement in law is that haulers must register in the town(s) in which they operate. The lack of direct control over haulers leads to a number of problems. These include data reporting, which is particularly problematic for the significant fraction of waste generated in Connecticut (about 15 percent) that is direct hauled out of state without going through any permitted facility. This also makes it difficult to enforce against haulers that are not complying with state solid waste laws. If haulers are required to register with the DEP and report certain information, the DEP, municipalities, regional solid waste entities, and other solid waste planning groups will have a better understanding of the amount of solid waste (from Connecticut, from individual municipalities, and from specific regions) hauled directly out-of-state. It will also facilitate compliance with solid waste requirements and will allow a leveling of the playing field in the assessment of the solid waste fee.

Enforcement

The enforcement methods employed by the Department have not changed much over several years. The tools available for enforcement include: warning notices and letters, notices of violation (NOVs), consent orders with or without penalties,

unilateral orders, civil action through the Attorney General's Office, and criminal action through the State's Attorney's Office. Issuance of NOVs happens fairly quickly and has resulted in meaningful return to compliance in many cases, however, if penalties are needed, the options for assessing them are time consuming.

The enforcement of recycling laws has historically been assigned lesser priority status than enforcement of other solid waste requirements, and have been considered secondary priority violations pursuant to the Department's Enforcement Response Policy. CT DEP enforcement staff gives priority to compliance at solid waste disposal facilities (i.e., landfills, RRFs) rather than at recycling facilities given the greater potential for environmental harm at these facilities. The overall result is that even clear violations of the State's recycling laws may rank as a lower priority compared to other solid waste violations, and the rate of compliance with mandatory recycling laws has not markedly improved over time.

At the local level, resources are often limited as well and, as a result, many municipalities are not enforcing the requirements of their own local recycling ordinances. This is the case even though historically and by state statute, each municipality is (1) responsible for making provision for the safe and sanitary disposal of all solid wastes generated within its boundaries and for the separation, collection, processing, and marketing of designated recyclables; (2) authorized by State statute to take enforcement actions (most municipalities having stated fines and penalties in their municipal waste and recycling ordinances); and (3) required to have a local recycling ordinance. Typically, some municipalities have not deemed it a priority to enforce recycling and other solid waste requirements.

Strategies for Improving the Solid Waste Permitting and Enforcement Programs

Strategies and policies that once supported a sound program for managing solid waste can no longer be relied upon to address the current and future challenges. With dramatic changes in many facets of the solid waste universe, including the shift from landfilling of municipal solid waste to transfer stations to resource recovery facilities, the growing export of solid waste to other states, and the continuing trend toward cheap throw-away consumer products, the response and the responsiveness of the Department must adjust to meet the demands of the times.

Although there has been increased productivity in solid waste permitting recently, additional changes must be made to streamline the permit process for traditional facilities and to assure that permit requirements for those traditional facilities promote the State goal of reducing the amount of waste disposed by increasing recycling. Efforts must also be made to expedite approvals for recycling and other beneficial use activities, including review and adoption of alternative methods for authorizing certain beneficial uses, such as exemptions from traditional permitting for reuse of eligible solid wastes.

Permitting Strategies:

Strategy 7-1. CT DEP will make the permitting of solid waste facilities that increase waste diversion from disposal a priority.

Strategy 7-2. CT DEP will designate a permitting team whose responsibility is to review all solid waste diversion applications and to make determinations in a timely manner.

Strategy 7-3. CT DEP will facilitate the permitting process by developing model permits and fact sheets for applicants and interested parties, so that the process and the applicant's obligations are well defined and readily comprehensible.

Strategy 7-4. CT DEP will establish target time frames for acting on solid waste diversion and beneficial use applications.

Strategy 7-5. CT DEP will review all relevant solid waste statutes and regulations and propose appropriate updates and revisions.

Strategy 7-6. CT DEP will streamline the beneficial use process, with consideration given to an exemption from permitting for certain types of materials.

Strategy 7-7. CT DEP will establish a streamlined method of regulating waste haulers in order to incorporate reporting and other substantive requirements, along with a simple means of assessing the solid waste fee.

Strategy 7-8. CT DEP will seek authority to establish categories of demonstration projects that would not require traditional permitting.

Strategy 7-9. CT DEP will continue to identify activities appropriate for approval by general permit, and devote staff resources to this effort.

Strategy 7-10. CT DEP will develop a procedure to allow the modification of existing permit approvals in order to facilitate improved or modified business operations and enhanced protection of the environment that are needed due to evolving technologies, markets conditions, and environmental concerns.

Strategy 7-11. Seek amendments to CGS Section 22a-208a(d) to allow municipal transfer stations to accept and do minimal separation of residentially generated construction and demolition waste without requiring full permit modifications and fees.

Strategy 7-12. CT DEP will establish criteria for C&D waste Volume Reduction Facilities to help ensure that more of this waste stream is diverted from disposal.

The following are examples of criteria to be considered:

- Encourage source separation of construction and demolition prior to acceptance at VRFs as necessary to maximize recycling;
- Sort and process construction and demolition waste in a manner that will minimize contamination of recyclable materials and maximize the quantity of reusable and marketable recyclable materials;
- Process demolition wood to make it suitable for use in clean energy technologies or for incineration at existing RRFs if deemed appropriate;
- Minimize the quantity of waste and processing residue requiring landfill disposal;
- Meet all statutory and regulatory requirements for the permitting of solid waste facilities; and
- CT DEP will consider requiring the development and operation of a VRF at each new lined special waste landfill that is developed.

Enforcement Strategies

Strategy 7-13. CT DEP will increase its compliance outreach efforts to develop a more comprehensive and mutually supportive network of communications with land use, public works, and other municipal officials who are directly involved in solid waste activities. CT DEP will take appropriate actions to ensure compliance.

Strategy 7-14. CT DEP will take enforcement actions against recycling law violators as necessary to ensure compliance.

Strategy 7-15. CT DEP will evaluate incentives that would encourage municipalities to take on enforcement responsibilities they are already authorized to do.

Strategy 7-16. CT DEP will establish civil penalty regulations for violations of recycling laws.

Strategy 7-17. CT DEP will evaluate additional tools for taking enforcement actions against violators of the solid waste statutes, regulations and permits.

Strategy 7-18. CT DEP will ensure that RRF's and other solid waste facilities including landfills and transfer stations comply with CGS Section 22a-220c(b) which requires solid waste facilities periodically to inspect loads delivered to them for significant quantities of recyclables and report such violation back to the municipalities.

4.3.8 Objective 8. Funding

Adopt stable, long-term funding mechanisms that provide sufficient revenue for state, regional and local programs while providing incentives for increased source reduction and recycling.

Overview

Establishing a long-term, stable system for providing adequate revenue to state, regional and local waste management entities and for funding waste disposal diversion efforts is the single most important requirement for achieving Connecticut's solid waste management goals and objectives, and realizing Connecticut's long range waste management vision. Funding mechanisms not only provide revenue, but they also can be structured to provide incentives for promoting waste diversion by waste generators, haulers, processors, recyclers, local governments and manufacturers.

Connecticut's citizens and decision makers need to understand that the State must increase funding for programs that divert waste from disposal (e.g. source reduction, recycling, composting) in order to mitigate the potential increased environmental and economic costs of disposing even greater amounts of waste, either in-state or out-of-state.

Current Solid Waste Management Budgeting

Currently Connecticut pays for solid waste management activities as follows:

- Local Governments, taxpayers and waste generators are responsible for paying the vast majority of all solid waste management costs in Connecticut.
- Some regional authorities and municipalities assess a surcharge on waste disposed to fund their programs.
- Some towns still own and operate their own bulky waste landfills. However, most solid waste generated in Connecticut is disposed or recycled through regional solid waste facilities (which generally charge tipping fees for disposal or processing – see exceptions listed below) located in Connecticut or out-of-state.
- Residential solid waste and recyclables are collected curbside either (1) by municipal employees (only in very few towns) or (2) by private haulers who are paid by residents directly or paid through town contract. In some municipalities these costs are paid out of tax revenue, while in others residents pay haulers directly. There are usually tipping fees (there are some exceptions) for waste or recyclables delivered to solid waste facilities. In some cases, the tipping fee is paid by the hauler, and in other cases it is paid by the municipality. Some recycling facilities provide revenue sharing for the recyclables delivered to their facility (when market value exceeds a set value). The tipping fee paid for waste delivered to the MidCT RRF and Bridgeport RRF subsidizes the fee for residential bottles, cans, and paper delivered to the Hartford or Stratford IPC, so there is no separate tipping fee for member town residential recyclables delivered to these two IPCs.
- In some towns, residents and small businesses can still self-haul their recyclables or garbage to a municipal transfer station. Non-residential solid waste and recyclables are collected by private haulers and are paid by their customers. There are a few exceptions where municipalities provide this service. The haulers pay tip fees at transfer, disposal and recycling processing facilities.

- Connecticut's bottle bill beverage distributors reimburse retailers or redemption centers the five cent deposit plus a handling fee of one and a half cents for each beer container and two cents for each carbonated soft drink (including mineral water and soda water) container redeemed and handled by the retailer or redemption center. Distributors retain the unredeemed deposits from consumers who choose not to redeem their bottles and cans, this can amount to a significant sum of money.
- Certain recycling collection programs are the responsibility of industry groups. For example, the beverage industry provides for redemption of bottle bill containers (as mentioned above); rechargeable batteries can be returned for recycling through programs developed and funded by the Rechargeable Battery Recycling Corporation (RBRC) program; lead acid storage batteries are returned to retailers for recycling by consumers to recover a deposit paid on the purchase of new batteries; directory publishers distributing their directories in Connecticut are responsible for recovering a percentage of those directories for recycling.
- Some CT DEP programs related to solid waste management are funded in part by a $1.50 fee on all waste disposed at Connecticut's resources recovery facilities (the "Solid Waste Assessment" CGS Section 22a-232). Pursuant to CGS Section 22a-233 that assessment is placed in the "solid waste account" which should be used by the CT DEP for a variety of solid waste planning, protection, and enforcement activities including but not limited to, pollution prevention, dioxin and furan testing; solid waste inspection and enforcement; solid waste facility operator and inspector training, and CT DEP staffing necessary to carry out such activities. In 2005, $2.9 million of revenue from this source was budgeted by Connecticut DEP to cover 29 positions and some limited contracted services related to the management of solid waste.

Recycling/Composting Program Funding History

In the late 1980s and early 1990s Connecticut distributed approximately $42 million in grants to Connecticut municipalities and recycling regions to help develop Connecticut's recycling program infrastructure and to support regional recycling coordinators, education and outreach. This funding was allocated as follows:

- $34 million in bond funds was used primarily for capital purchases of equipment such as tub-grinders, recycling trucks, and recycling and composting bins;
- $5.2 million trust fund was used primarily for public education, planning, project management and staff costs for regional recycling coordinators and
- $2.8 million in fuel overcharge funds were dedicated to two regional "demonstration projects," one in the southwest part of the State for the purchase of curbside recycling bins and one in the southeast part of the State to support modifications of an IPC in Groton.

  At the same time, state recycling program costs were funded by a one-time allocation of $10 million from state surplus funds (PA 86-1 Special Session II). Authorized uses included, but were not limited to, the following: the costs

associated with the development of a statewide recycling program plan, grants, and CT DEP administrative costs. The State recycling program did not receive authorization for any dedicated annual fees, assessments or taxes to maintain the program until the early 1990s when the legislature established a two-year assessment of $0.40/ton for solid waste processed at resource recovery facilities or disposed at MSW landfills. This assessment netted about $900,000 to the CT DEP to support the State Recycling Program. The remaining $1.3 million was used to provide a grant to the Southeastern CT Regional Resources Recovery Authority to subsidize RRF tipping fees. In 2005, the $1/ton solid waste assessment was increased by 50 percent to $1.50 per ton to help support approximately 29 staff in the CT DEP. This includes the seven staff formerly supported by the Recycling Trust Fund that was depleted in 2005.

Funding Needs

As a result of the investment at both the municipal and state level, Connecticut has achieved an estimated 30 percent MSW recycling rate, and although this represents significant progress, this rate has not increased in years. In addition Connecticut has made little progress in diverting other types of waste from disposal (e.g., C&D wastes, electronics, food wastes). Connecticut's current levels of source reduction, recycling and composting are insufficient to meet this Plan's goal for solid waste disposal minimization.

In order to reverse these trends and meet the Plan's goal for solid waste diversion, Connecticut needs to reinvigorate its source reduction and recycling efforts by implementing the strategies presented in this plan to ensure that the Plan's aggressive goals for reducing solid waste generated and disposed are met. To accomplish this, a stable and on-going mechanism for funding recycling and source reduction efforts at the local, regional, and state levels is needed. Such funding is especially critical to support municipal recycling/source reduction programs.

Estimating the exact costs to implement Connecticut's solid waste management strategies, as detailed in this chapter, is difficult. Many of the strategies will evolve over time, and responsibilities will vary. Funding requirements will vary based on, for example, how strategies are implemented, who does so (e.g., State and local government, regional waste authorities, contractors, others.), when they are implemented and the extent to which they are implemented. Most importantly, many of the strategies proposed in this Plan can be implemented at varying levels, with different levels of funding.

Barriers - Funding

The barriers to creating a stable source of funding for solid waste programs are clear: no one wants to pay increased costs for services. Making the problem worse, citizens, legislators, municipalities, businesses and many state agencies are relatively unaware of some of the significant solid waste disposal issues and the economic and environmental ramifications Connecticut will be facing in the next ten years. As a consequence, these issues are not perceived as a priority when competing with the

many demands on Connecticut's tax revenues and other sources of funding. As with any other proposal to expand government programs, difficult choices must be made in allocating limited public funds.

Strategies - Funding

Strategy 8-1. Adopt a comprehensive, long term, integrated solid waste management funding system to ensure that adequate revenue is available to implement the strategies and achieve the goals of this Plan. The Agency's Solid Waste Advisory Committee will assume a major role in identifying appropriate funding mechanisms.

This Plan proposes a reinvigoration of Connecticut's source reduction, recycling and composting efforts as well as new initiatives for decreasing the amount of waste disposed. Implementation of some of these strategies will involve significant changes in legislation and policy affecting the responsibilities of the DEP, regional authorities, local governments, waste haulers, waste generators, product manufacturers, distributors and retailers. A fundamental prerequisite for implementing many of the strategies is the availability of funding.

Ultimately, the costs of implementing this Plan will be determined by Connecticut legislators and other public and private decision makers as they make choices regarding integrated waste management efforts in the coming years. It will be necessary to build consensus for a package of funding and incentive mechanisms, in concert with consideration of the key proposals in this Plan, in preparation for the 2007 legislative session. This effort will have the goal of securing long-term funding, as well as building support and understanding of legislators and other stakeholders sufficient to adopt the key legislative and policy proposals needed to make progress toward Connecticut's long term solid waste management vision. A significant portion of the funds generated must be directed to municipalities and recycling regions to support programs to implement the priorities in this Plan especially to increase source reduction, recycling and composting. It is important that this funding be dedicated for solid waste management, so that funds originally designated for solid waste programs are not diverted to other purposes. The following potential sources of funding have been identified that could provide some support to these programs.

- **Expand the current $1.50 fee on waste processed at Connecticut RRFs to all disposed solid waste, including all MSW, C&D debris, and oversized MSW, whether disposed in-state or out-of-state.**

  Expanding the fee to all disposed solid waste levels the playing field between in-state and out-of-state waste disposal facilities, and will generate approximately $2 million per year in funding. Moreover, the system to implement the fee will provide data on an ongoing basis on Connecticut-generated solid waste disposed; providing measurement of progress towards the State's new waste disposal minimization objective.

- **Capture some portion of the unclaimed bottle/can deposits (escheats) to fund needed solid waste source reduction and recycling/composting programs at the state, regional and local levels.**

  Connecticut's bottle bill was implemented in 1980 and was originally designed as a litter control program. However, because the containers collected through this system were of such high quality, the bottles and cans collected attracted recycling markets and the bottle bill became a successful and effective recycling program as well as a litter control program. Estimates indicate that escheats (unclaimed deposits) in Connecticut in 2003 were approximately $19 million. The escheats represent deposits paid but not redeemed by consumers on bottle bill beverage containers and are currently retained by the beverage industry. Since bottle bill containers which are not redeemed become part of Connecticut's waste stream, it is appropriate that a portion of the escheats be returned to the to the towns or regional recycling operations to help fund their source reduction and recycling programs.

- **Direct penalty monies from solid waste enforcement actions to municipal and regional recycling and other diversion programs.**

  This Plan endorses an increase in enforcement as one important means of ensuring that recycling laws are complied with. Penalties derived through these actions are currently directed to the General Fund. Due to the nexus of these enforcement actions to the overall ability to increase the diversion rate, these penalties could be redirected to appropriately support municipal and regional programs aimed at recycling.

- **Increase the Solid Waste Assessment beyond the present $1.50 per ton.**

  Other states assess a much higher fee on the disposal of solid waste and there is a considerable range in the types of revenue producing streams that are tied to disposal of solid waste, that in turn support their solid waste management programs. Some examples include:

  - Missouri's surcharge of $2.11 per ton of waste disposed of at sanitary and demolition landfills;
  - Iowa's solid waste tonnage fee of $4.25 per ton of waste disposed at landfills;
  - Vermont's surcharge of $6 per ton on any Vermont waste disposed either in-state or out-of-state;
  - Pennsylvania's surcharge of $7.25 per ton for waste processed at RRFs or disposed at landfills; and
  - West Virginia's state and local waste assessment fee of $8.75 per ton of waste disposed at landfills.

- **Use State bond funds for needed infrastructure projects such as publicly controlled composting facilities and recycling facilities.**

Chapter 5
IMPLEMENTATION CONSIDERATIONS

5.1 Introduction

Connecticut's Solid Waste Management Plan is a strategic-level guidance document. It is meant to be a dynamic tool that the State, regions, and municipalities can refer to for guidance in making critical decisions about program implementation. To implement the strategies described in Chapter 4, identifying the partners, and priorities and timeframes will be critical to ensuring success. A major issue that potentially will affect the way the State manages its solid waste is the expected change of control of disposal capacity at four of the six Connecticut MSW RRFs – from public to private.

- **Roles and Responsibilities –** An effective management system needs to be built and the institutional capacity must be maintained to effectively manage MSW at the state, regional and local levels. Furthermore, every stakeholder that will play a role in implementing the strategic Plan, will need to understand what they will be responsible for implementing.
- **Public or Private Control of Waste Disposal Facilities -** Connecticut relies heavily on the six resources recovery facilities for the safe disposal of the State's municipal solid waste that is not recycled. Over the next fifteen years, one of these facilities may close and three of the facilities may shift from public to private control of disposal capacity.
- **Priorities and Implementation Timeframes –** The relative importance of each strategy needs to be determined given that resources will be insufficient to undertake all strategies simultaneously or to the fullest possible extent.

This chapter further describes these key elements.

5.2 Roles and Responsibilities for Plan Implementation

Attainment of the vision and outcomes described in this Plan will be a long-term process. Substantial changes to current practices will be required, and commitment will be needed on the part of all stakeholders who will share in the responsibility of achieving these outcomes. Realizing Connecticut's solid waste management vision will be a function of effective management paired with sufficient organizational capacity to implement the proposed waste reduction, recycling, and solid waste management system improvements.

The components of an effective management system are as follows:

- **Ongoing communication, consensus and coordination among Connecticut agencies and other organizations active in solid waste reduction and management in Connecticut as well as the region –** Communication, consensus and coordination raise the probability of success and the level of impact, and build political support among decision makers and the legislature for future efforts. The absence of these elements will result in wasted resources. Some measure of trust and collaboration among principal stakeholders must be developed and maintained.
- **Agreement regarding the overall solid waste management goals and priorities –** It is not unusual for various entities involved in recycling and solid waste management to have different goals and expectations. Efforts need to be undertaken to build and sustain stakeholder support for the vision, goals and strategies outlined in the Plan and the priorities most in need of attention. Goals and priorities should be periodically revised to reflect changing circumstances and needs.
- **Current, accurate market intelligence and assessment –** Good market intelligence is a function of collecting and integrating information and perspectives from a wide network of public and private sources. Up-to-date market intelligence and assessment should be used to proactively make appropriate adjustments in ongoing activities, as necessary.
- **Focused approach to strategy and program development –** A well-designed and managed statewide solid waste management system is comprised of programs and services that target key barriers and opportunities, utilizing tools that are appropriate for addressing them, and run by organizations capable of effectively utilizing the selected tools. While the programmatic and organizational structure can be fairly constant over time, program priorities and the overall strategy for using program resources should be regularly and consistently updated.
- **Effective implementation management –** Implementation management consists of program planning and budgeting, fulfillment of assigned roles and responsibilities, and coordinating actions of organizations and staff. Ideally, this involves the cost-effective allocation of financial and human resources available for solid waste management, overseen and guided by an appropriate coordinating mechanism that includes the key organizations responsible. In order for efforts to be successful, some consistency and certainty with regard to program funding is desirable.
- **Regular monitoring of implementation efforts in terms of their being appropriate and effective, and flexible in adjusting strategies and tools accordingly –** Appropriateness evaluation asks if the program is aiming at the right targets. Effectiveness evaluation asks how well the program is achieving its targets. Evaluation is carried out for two reasons – program improvement and program justification. Improvement of solid waste management programs and services requires a systematic approach to learning about what is working, what is not working, and why. Program justification, demonstrated through impact analysis, is intended to inform program funders, participants, and target audiences

about the program's value and cost effectiveness. To the extent possible, program data and information that would facilitate evaluation should be collected as part of ongoing operations.

- **Informed, enthusiastic organizations and staff –** Effective solid waste management requires an ongoing focus on building and maintaining institutional capacity for intelligent action. In particular, involved agencies and organizations should:
  - Keep abreast of solid waste management developments and issues, supporting staff in being proactive in identifying and responding to new information regarding barriers, opportunities, program impacts and effective practices;
  - Hire and retain staff that are knowledgeable, flexible and adaptable, and eager to learn; and
  - Provide sufficient funding to develop and sustain the necessary staff capacity and program resources.

To the extent possible, efforts should be structured so that they can continue without interruption when staff turnover does take place. Specific recommendations regarding roles and responsibilities of key stakeholders, both with respect to programs and management, are discussed below.

As presented in the Plan's vision statement, Connecticut will continue its progression toward a shared responsibility management approach that reflects increasing responsibility placed on the producers and generators of materials discarded as waste. All those involved in the attainment of this vision will have important roles to play, from the individual citizen to municipalities, owners and operators of solid waste facilities, waste haulers, regional solid waste programs, and state agencies. A brief discussion of roles for key partners follows:

5.2.1 Role of the U.S. EPA

On behalf of the federal government, the EPA Office of Solid Waste ("OSW") regulates all solid waste under the Resource Conservation and Recovery Act ("RCRA"). In addition to regulating the management of solid wastes, the OSW has established the objectives as listed in the OSW Strategic Plan, many of which are also shared by Connecticut with respect to strategies outlined in this solid waste management plan, thereby indicating areas for possible joint collaboration between Connecticut and OSW. OSW has established several formal partnership programs to provide for such involvement. These include: the National Partnership for Environmental Priorities ("NPEP"), Plug-In to e-Cycling, the Product Stewardship initiative, and WasteWise. Connecticut is an appropriate partner to work with OSW in these efforts. In addition, the OSW provides technical guides, educational materials, training opportunities, data gathering guidelines as well as national data, and limited grant funding to help implement that support its national objectives. Many of these materials and resources have beneficial application in Connecticut and merit investigation, if not already in use.

5.2.2 Role of the CT DEP

The CT DEP is the primary author and implementer of this Plan. Through the CT DEP, Connecticut works to protect public health, safety and the environment by minimizing adverse effects from the treatment, storage, disposal and transportation of solid and hazardous wastes, hazardous substances and pesticides. The CT DEP achieves its mission by educating the public and by developing and implementing regulations, policies, procedures, standards, and grant programs to administer the existing and emerging federal and state waste management laws. The CT DEP's range of responsibilities includes encouraging pollution prevention and recycling; regulating the generation, transportation, treatment, storage and disposal of hazardous wastes; developing capacity and expertise to respond to emergency spill and contamination incidents; developing comprehensive programs for the environmentally safe transport, handling and disposal of petroleum products; and regulating the use of pesticides and minimizing human and non-target species exposure.

5.2.3 Role of the Connecticut Resources Recovery Authority (CRRA)

Many of the significant issues that must be dealt with under this Plan will involve CRRA, and will be affected by the role to be played by CRRA. Through passage in 1973 of the Solid Waste Management Services Act, Chapter 446e, the CRRA was created for the following purposes, among them a significant role in the development of and revisions to this Plan.

Section 22a-262 of the General Statutes provides that "The purposes of the authority shall be:

(1) The planning, design, construction, financing, management, ownership, operation and maintenance of solid waste disposal, volume reduction, recycling, intermediate processing and resources recovery facilities and all related solid waste reception, storage, transportation and waste-handling and general support facilities considered by the authority to be necessary, desirable, convenient or appropriate in carrying out the provisions of the state solid waste management plan and in establishing, managing and operating solid waste disposal and resources recovery systems and their component waste-processing facilities and equipment;

(2) The provision of solid waste management services to municipalities, regions and persons within the state by receiving solid wastes at authority facilities, pursuant to contracts between the authority and such municipalities, regions and persons; the recovery of resources and resource values from such solid wastes; and the production from such services and resources recovery operations of revenues sufficient to provide for the support of the authority and its operations on a self-sustaining basis, with due allowance for the redistribution of any surplus revenues…;

(3) The utilization, through contractual arrangements, of private industry for implementation of some or all of the requirements of the state solid waste

management plan and for such other activities as may be considered necessary, desirable or convenient by the authority;

(4) Assistance with and coordination of efforts directed toward source separation for recycling purposes; and

(5) Assistance in the development of industries, technologies and commercial enterprises within the state of Connecticut based upon resources recovery, recycling, reuse and treatment or processing of solid waste."

Further, Section 22a-264 gives CRRA the authority to:

- "…assist in the preparation, revision, extension or amendment of the state solid waste management plan…" ;
- "…revise and update, as may be necessary to carry out the purposes of this chapter, that portion of the state solid waste management plan defined as the "solid waste management system.";

The CRRA was established to serve the interests of its municipal customers as described in the CRRA mission statement, revised in 2002:

"To work for – and in – the best interests of the municipalities of the State of Connecticut in developing and implementing environmentally sound solutions and best practices for solid waste disposal and recycling management on behalf of municipalities."

Since its creation, CRRA has been focused on the provision, both directly and in partnership with others, of certain core solid waste services including the following:

- Transfer station operation
- RRFs
- Ash residue disposal
- Recycling
- Household hazardous waste collection and disposal
- Education

CRRA has significantly increased its emphasis on recycling and education activities through its trash museums over the last few years. It has strengthened efforts to promote education at the state's two waste museums in Hartford and Stratford, and it has increased efforts to recycle more waste such as paper and electronics. This experience may position CRRA to play a more significant role in the State's efforts to meet its aggressive waste diversion goals, especially in those areas requiring new or expanded infrastructure such as paper recycling, C&D waste recycling, composting and electronics recycling. In implementing these expanded programs, it will be important to work closely with other state agencies with business/economic development expertise and responsibilities. It is of note that CRRA has not historically exercised its authority in all areas authorized by the law. In considering this Plan and its implementation, now is an appropriate time for the executive and legislative branches of State government, the State's municipalities, and CRRA itself,

to evaluate the roles that CRRA, and potentially other State or quasi-state agencies could play in implementing this Plan.

Fulfilling Connecticut's waste management needs depends heavily on a close working relationship with and between the implementing agencies and the state's municipalities. This will be critical in such areas as assistance, contracting, disposal and other key services. There must be a strong working relationship between Connecticut's municipalities and any entity ultimately charged with assisting the towns to meet their waste management obligations. Whether directly providing waste management services and infrastructure or indirectly assisting in areas such as education and acquisition of outside contract services, trust and clear roles need to be established. Due to the fragmentation of the State's municipalities into various authorities for waste management, and the recent history of CRRA's expansion into activities beyond their traditional roles, now is the time to reconsider the roles these various authorities can serve.

5.2.4 Role of Other State Agencies

Other agencies such as the Departments of Economic and Community Development, Transportation, Administrative Services and Public Works and the Connecticut Development Authority, will be important in the efforts to establish new State policies and practices and develop business infrastructure and markets for recycling and composting or other businesses that may help attain the goals of this Plan.

5.2.5 Role of Regional Entities

Because there are 169 municipalities in Connecticut, and no county-level government, it makes sense for some solid waste management programs and planning functions to occur at the regional level – thus taking advantage of economies of scale and shared resources. Some regional efforts already exist for the following purposes:

- Hold HHW collection events;
- Hold electronics recycling events;
- Contract for the processing of recyclable materials;
- Operate specific types of solid waste management facilities for use by member jurisdictions; and
- Provide recycling and other solid waste education to member municipalities

Such regional entities include operating committees and authorities.

It is anticipated that State funding for the support and promotion of source reduction, recycling and composting may be distributed to regional entities, as well as pass-through funds for distribution by the regions to municipalities whose grant requests are compatible with regional priorities and regional solid waste management plan that address goals and strategies as listed in the State's Solid Waste Management Plan. If a municipality wishes to undertake its own solid waste management planning initiatives consistent with the Plan, it may receive State funding directly through the CT DEP.

Examples of regional planning approaches in Connecticut include: regional planning agencies as well as regional waste authorities such as operating committees, and resource recovery authorities. For example, there are fifteen local planning regions covering all of Connecticut, for the purpose of undertaking certain regional infrastructure planning and coordination activities, such as transportation planning. Through local ordinance, the municipalities within each of these planning regions have voluntarily created one of the three types of Regional Planning Organizations allowed under Connecticut statute (Regional Council of Elected Officials, a Regional Council of Governments, or a Regional Planning Agency) to carry out a variety of regional planning and other activities on their behalf. Some of these regional planning entities are the same entities coordinating some of the above solid waste management activities. Given that the CT Regional Planning Organizations uniformly cover all municipalities in Connecticut and are already in existence to perform similar functions, with some already doing so, there is merit for these organizations to work with their member towns on solid waste management issues including source reduction, recycling, and composting. With regard to regional waste authorities such as the Housatonic Resource Recovery Authority, the Southeastern Connecticut Regional Resource Recovery Authority, and Bristol Resource Recovery Facility Operating Committiee/Tunxis Recycling Operation Committee there is a good foundation and great opportunity to manage solid waste on a regional level.

5.2.6 Role of Municipalities

Municipalities play one of the most important roles of all in the implementation of this Plan. By Connecticut State Statute Ch 446d, Sec.22a-220, municipalities (or municipal authorities) in Connecticut shall provide for the safe and sanitary disposal of all solid waste generated within their boundaries. Municipalities must also make provisions for recycling of mandated items. In Connecticut municipalities can designate the area where solid waste generated within its boundaries by residential, business, commercial, or other establishments shall be disposed. Municipalities can also designate where certain residential recyclables shall be taken for processing. Municipalities are responsible for submitting annual recycling reports to the CT DEP, are required to have designated a recycling contact person, were required to have adopted local recycling ordinances and have the authority and responsibility of enforcing those ordinances. With regard to the programs directed at individuals, the vast majority of work is done at the local level, and the same is true for the expanded efforts called for in this Plan.

5.2.7 Role of Private Sector, Including Product Manufacturers

Private industry is heavily involved in a broad range of efforts in solid waste management, from the manufacturing and retail end to the companies that collect, recycle, transport and dispose of the waste. The waste management industry must bring their unique expertise to develop ways of making the collection, transport and disposal of waste materials more efficient with less environmental impact. They must also accept the new mandates and requirements that will be created to allow waste diversion from disposal to become the primary management method of achieving

these goals. The private sector waste industry may need to fill gaps in capacity for disposal and management of waste.

Product manufacturers and other companies in the supply chain such as suppliers, distributors and retailers share responsibility for achieving waste management objectives involving their products. These companies are responsible for designing and marketing products and packaging, and as such, their role includes considering recyclability, waste generation and toxicity in product design, and facilitating recycling by accepting a degree of financial or physical responsibility for achieving goals. They must continue to form industry partnerships to collaborate with their competitors in finding solutions to the tough problems identified in this Plan. In addition, a large part of the success in implementing this plan will depend on both existing industry stepping up to do more to recycle their waste materials, and new industry forming to take advantage of the new opportunities and incentives that will be created. This Plan envisions that this shift towards a shared responsibility framework will continue to occur gradually, through the multi-state product stewardship initiatives sponsored by such organizations as the Northeast Recycling Council and the Product Stewardship Institute (Connecticut is a member of both organizations). The shift will also occur through in-state legislative and policy approaches as appropriate, and this Plan identifies several areas involving funding and recycling policies, for example, those targeting electronics, construction waste recycling, food waste composting, beverage containers, and other products.

5.2.8 Role of Residents/Consumers/Commercial Waste Generators

Finally, the focus of all of these efforts comes down to the individual citizen, all of us. We will all be expected to share in the responsibility of making this Plan work. Accepting that responsibility will come in many forms: changing our recycling practices at home and at work, composting at home, buying things that create less waste, and, perhaps most importantly, accepting the costs of implementing these programs. Residents and commercial waste generators have an obligation to separate mandated recyclable materials, per CGS 22a-241b, and to manage their waste to be disposed properly (e.g., not dispose of it illegally). This Plan asserts that it is also appropriate for residents and businesses, as consumers of materials and generators of waste, to take some financial responsibility for the end-of-life management for goods and packaging from goods that they consume. This Plan encourages implementation of Pay-as-You-Throw programs that charge waste generators for waste disposal services based on the quantity of waste disposed.

5.3 Public or Private Control of Waste Disposal Facilities

Major changes are coming over the next several years regarding the ownership, operation and contracting for disposal services provided by most of the Resources Recovery Facilities. The complicated financing, construction and operating

agreements that were put in place when the RRFs were constructed include provisions for transfer of ownership and control of most of the RRFs to the private sector by 2015, unless state and/or local governments exercise certain options to retain or obtain ownership.

The pertinent time frames for these changes to take place are as follows: Bridgeport RRF in 2008; Preston RRF in 2015; Bristol RRF, any time prior to 2015; and Wallingford RRF, any time prior to 2010. A more detailed explanation of this situation was provided by CRRA and the Bristol Resources Recovery Facility Operating Committee, and is found in Appendix K. The following summarizes the status of each of the RRFs on this issue:

5.3.1 Hartford (Mid CT) RRF

- Owned and controlled by CRRA.
- Operated by Covanta and MDC; operating contracts will expire in 2015.
- Ownership will remain with CRRA post-contract expiration.

5.3.2 Bridgeport RRF

- Operating contract with Wheelabrator expires 12/31/08.
- Final repayment of project bonds 12/31/08.
- Owner trustee has option to purchase facility for $1.00 at contract expiration.

5.3.3 Wallingford RRF

- Owned by CRRA; operated by Covanta.
- Operating contracts expire 6/30/10, w/ options to extend by Covanta or CRRA.
- Prior to 1/31/10, Covanta has option to purchase for $1.00, or CRRA can purchase at fair market value.

5.3.4 Preston RRF

- Owned by CRRA; operated by Covanta.
- Operating contract expires 11/30/15.
- CRRA has option to buy at fair market value at conclusion of project.

5.3.5 Bristol RRF

- Owned by Covanta now; operated by Covanta.
- Contract expires in 2015.
- At any time, member towns have an option to buy the facility for fair market value.

- Covanta could sell the facility to another party if the member towns don't want it.
- CRRA has no role, other than as a potential buyer if the member towns don't want to buy.

5.3.6 Lisbon RRF

- Owned by the Eastern CT Resource Recovery Authority (ECRRA) with the sole member being the City of Middletown, CT.
- Wheelabrator has an operating agreement with ECRRA with no ownership interest.
- The municipal bonds will be paid in 2020.
- When the bonds are paid – the facility will be owned by ECRRA.

While the ultimate outcome is uncertain, by 2015, with the exception of CRRA's Mid-CT facility and ECRRA's Lisbon RRF, the other Connecticut Resource Recovery Authority's facility capacity could be in private ownership. Some stakeholders have raised concerns regarding this transfer of ownership, and many in the solid waste arena have suggested that the State take proactive steps to retain public ownership of the RRFs. This Plan does not take a position on this issue, other than to make clear that it is an important issue that should be fully understood and debated by the public, and local and State officials so appropriate steps can be taken if necessary. To retain public control of these services will require significant public expenditures, but these may be expenditures that are appropriate given the critical nature of the services involved.

The General Assembly has recently taken action in recognizing some of these issues. In 2003, Section 22a-268f of the General Statutes was adopted requiring CRRA to evaluate options for disposal in a timely fashion. This statute requires that, no later than two years prior to the final maturity date of bonds for any resources recovery project, CRRA must form a committee, made up of representatives of CRRA and the municipalities using the facility, and do a study of options for solid waste disposal from those municipalities. It is critical that these studies be performed so the State, CRRA and the municipalities can make informed decisions regarding solid waste disposal after the present contracts expire.

5.4 Priorities and Timeframes

This Plan proposes numerous strategies for achieving the State's long-term solid waste management goals. For planning purposes, as well as the prudent use of resources, it is essential that priorities among the Plan's strategies be established. The relative importance of each strategy needs to be determined given that resources will be insufficient to undertake all strategies simultaneously or to the fullest possible extent. In addition, Strategies need to be mapped chronologically so that all parties involved have a sense of when they are to be undertaken. These priorities were established based on consideration of the following criteria:

- The importance of the strategy in bringing Connecticut closer to its solid waste vision and goals;
- The ease of implementation and institutional feasibility of the strategy;
- The costs and cost-effectiveness of the strategy relative to the resources available; and
- The extent to which other strategies are dependent upon the strategy.

The priorities and timeframe for each strategy in the Plan are identified in Table 5-1 below. A more detailed discussion of each strategy is presented in Chapter 4.

Table 5-1
Annotated List of Recommended Strategies for Solid Waste Management in Connecticut

Strategy Number	Recommended Strategy	Type of Action	Priority	New Costs (1)	Initiation Time Frame	Responsibility Lead/ Key Partners (2)
		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
Objective 1	Source Reduction					
1-1	Continue to implement the Department's Pollution Prevention Plan which establishes goals and identifies strategies to reduce the quantity and toxicity of wastes discharged to the land, air, and waters of the State.	Administrative	Medium	Staff = $	Existing	DEP
1-2	Educate consumers and businesses about the effects of their purchasing choices and behaviors on waste generation and provide education and incentives to help change purchasing and behavioral practices to reduce the amount and toxicity of waste produced.	Administrative	High	Staff = $$ Other = $$	Short term	DEP
1-3	Continue to support regional and national efforts to change manufacturer practices to produce products that generate less waste and less toxic waste.	Administrative	Medium	Staff = $	Existing	DEP

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

(2) Lead will be responsible for initiating action, Key Partners may be responsible for implementation

(3) Other costs include capital costs, grants, consulting fees, etc.

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		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
1-4	Continue to promote environmentally preferable purchasing ("EPP") standards in state and local government; encourage state agencies and municipalities to become members of EPA's WasteWise program; support green design standards; and encourage adoption of the standards by Connecticut local governments and institutions.	Administrative	High	Staff = $	Existing	DAS/ DEP & municipalities
1-5	Provide funding to promote reuse and publicize product reuse opportunities.	Legislative, Administrative	Medium	Other = $	Short term	TBD
1-6	Promote through such activities as technical assistance, start-up funding, and/or other incentives, the implementation of effective pay-as-you-throw (PAYT) pricing systems by municipalities and haulers for managing solid waste from residents and small businesses to achieve waste reduction.	Administrative	High	Staff = $$ Other = $$	Mid term	TBD/ Municipalities & Regional

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
1-7	Secure partnerships, provide funding and coordinate a model source- reduction program to reduce the amount and toxicity of solid waste generated in at least one Connecticut community.	Administrative	Low- Medium	Staff = $ Other = TBD	Mid term	DEP/ Municipalities and others TBD
1-8	Continue to enforce Connecticut's Toxics in Packaging Act and other toxic reduction programs and efforts. Continue to work in conjunction with the Toxics in Packaging Clearing House and other member states to assess compliance rates with toxics in packaging laws.	Administrative	Medium	Minimal	Existing	DEP/ Regional
Objective 2	Recycling and Composting					
2-1	Update Connecticut's beverage container deposit system by increasing the deposit amount and expanding coverage to at least plastic water bottles.	Legislative	High	Staff = $ Other = $$$	Short term	DEP/ Private sector
2-2	Add plastics PET #1 and HDPE #2 and magazines to the list of State mandated recyclables.	Legislative	High	Staff = $ Other = $$	Short term	DEP/ Municipal & private sector

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
2-3	Establish environmentally preferable purchasing (EPP) as state policy. Continue to support EPP at CT DAS and promote and ensure state agencies and political subdivision utilization of EPP standards. CT DEP and CT DAS will evaluate the relevant statutes to ensure their completeness and effectiveness in actual State purchasing practices.	Administrative	High	Minimal	Short term	DAS/ DEP & municipal
2-4	Establish a subcommittee of the Agency's Solid Waste Management Advisory Committee for the purpose of identifying methods to implement pay-as-you-throw (PAYT) on a voluntary basis. Specifically the subcommittee will identify incentives for municipalities and haulers to implement effective PAYT pricing systems for managing solid waste from residents and small businesses to achieve waste reduction. (See 6.3)	Administrative	High	Minimal	Mid term	DEP/ Multi-stakeholder committee

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
2-5	Increase technical assistance, education and outreach, and enforcement with regard to the business and industry sectors (especially the small businesses) and institutions to decrease their waste disposal rates by increasing recycling and source reduction. Promote EPP, including recycled content products, by Connecticut's businesses, industries, and institutions.	Administrative, Regulatory	High	Staff = $$ Other = $$	Short term	DEP/ Municipal, regional and others TBD
2-6	Continue the CT DEP's Municipal Recycling Honor Roll Awards Program and the Green Circle Awards Program to recognize and support exemplary source reduction and recycling practices.	Administrative	Medium	Minimal	Existing	DEP
2-7	CT DEP in collaboration with regional authorities and the hauling industry will identify incentives for haulers to increase the amount of material recovered for recycling.	Administrative	Medium	Staff = minimal Other = $ - $$	Mid term	DEP/ Private, Regional

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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2-8	Develop the infrastructure necessary to increase the amount of paper that is recycled. Create incentives and funding for increased paper recycling and for source reducing the amount of waste paper generated.	Administrative	Medium	Staff = $ Other = $	Mid term	TBD/ Regional, Private
2-9	Support the continued recycling of non-mandated recyclables.	Administrative	Low	Minimal	Existing	Municipal & Regional
2-10	CT DEP and a subcommittee of the Agency's Solid Waste Management Advisory Committee and other State Agencies will work with recycling business representatives to facilitate the development, expansion, and creation of markets for recycled materials. (See 6.3)	Administrative	Low – Medium	Staff = $ Other = $$	Mid term	DEP/ other state agencies TBD
2-11	Build local, regional, and state capacity for implementing State recycling policies, regional planning and program implementation, and recycling information sharing.	Administrative	High	Staff = $$$	Short term	TBD/ DEP, Municipal, Regional, & others

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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2-12	CT DEP and regional recycling entities will work to build partnerships with groups that can assist with and support the State's recycling efforts. Potential partnerships include regional recycling programs, municipalities, CRRA, trade associations, non-governmental organizations (NGOs), universities and others.	Administrative	Medium	Staff = $	Mid term	DEP/ Regional & other stakeholders
2-13	CT DEP will designate a "state source reduction/recycling coordinator" to coordinate and implement the strategies described in this section and other sections of the Plan to increase source reduction, recycling, and composting.	Administrative	High	Staff = $	Short term	DEP
2-14	Identify the internal barriers and solutions to streamlining the permitting process for source separated organic material recycling, especially for those institutional, commercial and industrial operations that process food scraps, soiled paper and waxed cardboard.	Administrative	High	Staff = $	Mid term	DEP/ Private

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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2-15	Establish a subcommittee of the Agency's Solid Waste Management Advisory Committee to discuss options that could stimulate organics recycling especially food scraps, soiled paper and waxed cardboard from the institutional, commercial and industrial sectors. (See 6.3)	Administrative	High	Minimal	Short term	DEP/ Stakeholders
2-16	Include compost and compostable materials in a statewide or regional on-line materials exchange to link generators of source separated organic material with processors and compost users.	Administrative	Low	Staff = $ Other = $	Mid term	TBD/ Private
2-17	Encourage the marketing of compost products for such uses as, erosion control, potting soil blends, topsoil blends, playing field mediums, etc.	Administrative	Low	Minimal	Mid term/ existing	TBD/ Stakeholders
2-18	Promote home composting and grasscycling.	Administrative	Medium	Other = $-$$	Mid term	DEP/ Municipal

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Objective 3	Management of Solid Waste Requiring Disposal					
3-1	Minimize the need for additional capacity for disposal of MSW, ash residue and C&D waste through aggressive implementation of the source reduction, recycling, composting and other initiatives in this Plan.	All types	High	$$$	Short term	All partners
3-2	The State will monitor waste generation and capacity on a regular basis, and with input from the Solid Waste Advisory Committee, evaluate the need for additional MSW, ash residue and C&D waste disposal capacity (See 6.3)	Administrative	High	Staff = $	Mid term	DEP

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3-3	The Department will seek legislative authorization to require any applicant for new RRF or landfill capacity, at the time any application is submitted to DEP, to create a fund to be accessed by the host municipality, to (1) create a local advisory committee and (2) hire appropriate experts, to assist the host municipality in reviewing the application and taking part in the application process. The advisory committee should include elected officials and residents from both the host community and contiguous communities.	Legislative, Administrative	High	Staff = $ Other = $$	Short term	DEP/ Applicants and stakeholders
3-4	Seek legislative authority to ban un-processed C&D waste from being disposed at any new Connecticut landfills, or Resource Recovery Facilities, or being delivered to any new Connecticut Transfer Stations (which transfer such waste to disposal facilities), and by a date certain extend the ban to existing landfills, RRFs, and transfer stations.	Legislative, Administrative	High	Staff = $ Other = $$$	Short term	DEP/ Private sector
3-5	Research and track new solid waste management technologies that have the potential to reduce environmental impacts and maximize benefits.	Administrative	Low	Minimal	Long term	TBD

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Objective 4	Management of Special Waste and Other Types of Waste					
4-1	Establish a subcommittee of the Agency Solid Waste Management Advisory Committee to identify opportunities to reuse and recycle building related C&D waste. (See 6.3)	Administrative	High	Staff = $	Short term	DEP/ Private
4-2	Revise the statutory and regulatory definitions of solid wastes and solid waste categories to more accurately reflect the character and management of these wastes.	Legislative, Regulatory	Medium	Staff = $	Mid term	DEP
4-3	Manage building related C&D waste, that cannot be reduced, reused, recycled, or composted, in a manner that ensures protection of land, air, and water resources and the public health, in compliance with the State hierarchy for managing solid waste.	Administrative, Regulatory	High	Staff = $ Other = $$$	Mid term	DEP/ Private & other stakeholders

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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4-4	Support reuse and recycling of highway/road C&D waste and dispose of that portion that cannot be reduced, reused, recycled or composted, in a manner that ensures protection of land, air, and water resources and the public health in compliance with the state hierarchy for managing solid waste.	Administrative	Medium	Minimal	Existing	DEP/ DOT, Municipal
4-5	Increase the recycling, composting and beneficial use of land clearing debris.	Administrative	Medium	Staff = $ Other = $$	Mid term	DEP/ Private, Municipal, private sector
4-6	Increase the reuse and recycling of oversized MSW.	Administrative	Low	TBD	Long term	DEP/ Regional, and other partners
4-7	Manage oversized MSW (that cannot be reused or recycled) in a manner that ensures protection of land, air, and water resources and the public health in compliance with the state hierarchy for managing solid waste.	Administrative, Regulatory	High	Staff = $ Other = $$$	Mid term	TBD

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4-8	Seek legislation that provides for recycling of electronic wastes based on a producer responsibility model.	Legislative	High	Staff = $ Other = TBD	Short term	DEP/ private stakeholders
4-9	Enhance the statewide Household Hazardous Waste Program.	Administrative	Low	Staff = min. Other = $$S	Long term	DEP/ municipal
4-10	CT DEP will continue to monitor and research management options for other types of special wastes that have not been adequately addressed to date, or as problems and the need arises, and as resources allow. Types of wastes that need to be addressed include: animal mortalities; road wastes; dredge material from Long Island Sound; contaminated soils; sewage sludge; preservative treated wood; sharps and waste pharmaceuticals; and disaster debris.	Administrative	Low - high	TBD	Short term – Long term	DEP/ Others

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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Objective 5	Education and Outreach					
5-1	Undertake Education and Outreach Actions Using Minimal Additional Resources. Such actions could include: coordinating existing resources and sharing information; enhancing the CT DEP website; promoting awareness through recognition programs; integrating solid waste issues with other environmental issues; ongoing outreach to media; and encouraging municipalities to provide solid waste and recycling information to residents and businesses.	Administrative	High	Staff = min. Other = $	Short term	DEP/ Municipal and others TBD
5-2	Undertake Education and Outreach Actions Using Additional Resources. These actions can include: provide comprehensive assistance to regional and local outreach programs; develop partnerships; and assess and modify outreach programs on a two year basis.	Administrative	High	Staff = $ Other = $$	Mid term	DEP/ Municipal and others TBD

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5-3	Undertake Education and Outreach Actions Using Expanded Resources. These actions can include: research and develop effective outreach approaches; disseminate new educational and outreach materials; develop an independent recycling web site that acts as a clearinghouse and listserve for municipal and regional recycling coordinators; and develop education and technical assistance for targeted sectors.	Administrative	High	Staff = $$ Other = $$$	Long term	DEP/ Municipal and others TBD
Objective 6	Program Planning, Evaluation, and Measurement					
6-1	Establish per capita waste disposal minimization goals for MSW and C&D/Oversized MSW.	Administrative	High	Minimal	Short term	DEP
6-2	Minimize the reporting burden for municipalities and others by only requiring the collection of data necessary to support the goals of the Plan and provide the information needed for on-going solid waste management planning and evaluation.	Administrative, Regulatory	High	Staff = $ Other = $$	Mid term	DEP/ Municipal

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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6-3	Establish a standing Solid Waste Advisory Committee of affected stakeholders to help implement the new plan, revise the plan, identify emerging issues and find solutions.	Administrative	High	Staff = $	Short term	DEP
6-4	Implement an iterative planning process for the State's Solid Waste Management Plan to allow revisions on a more frequent and as needed basis following the management system Plan/Do/Check/Act/ model. A strong on-going stakeholder process, local and regional planning, and an improved methodology for measuring success will inform the planning cycle.	Administrative	High	Staff = $	Short term	DEP/ Stakeholders

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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6-5	Evaluate and make recommendations for changes to underlying legal authorities to improve state, regional, and local solid waste planning and coordination. Develop system performance benchmarks relevant at both the state and local level aimed at achieving a unified solid waste management vision. Explore opportunities to fund planning activities at the state, regional, and local level; and, develop incentives for full participation.	Administrative	High	Staff = $$ Other = $$	Mid term	DEP/ Stakeholders
6-6	Provide training and informational materials to municipal officials, regional and local waste management and recycling staff regarding best practices and strategies for strengthening solid waste and recycling programs. Encourage communities and regional recycling programs to share their best practices and strategies. Investigate the possibility of established a municipal solid waste/recycling mentor program.	Administrative	High	Staff = $ Other = $	Short term	DEP/ Municipal

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Objective 7	Permitting and Enforcement					
7-1	CT DEP will make the permitting of solid waste facilities that increase waste diversion from disposal a priority.	Administrative	High	Minimal	Short term	DEP
7-2	CT DEP will designate a permitting team whose responsibility is to review all solid waste diversion applications and to make determinations in a timely manner.	Administrative	High	Minimal	Short term	DEP
7-3	CT DEP will facilitate the permitting process by developing model permits and fact sheets for applicants and interested parties, so that the process and the applicant's obligations are well defined and readily comprehensible.	Administrative	Medium	Staff = $ - $$	Mid term	DEP
7-4	CT DEP will establish target time frames for acting on solid waste diversion and beneficial use applications.	Administrative	Low	Minimal	Mid term	DEP

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

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7-5	CT DEP will review all relevant solid waste statutes and regulations and propose appropriate updates and revisions.	Administrative, Legislative, Regulatory	High	Staff= $ Other = 0	Short term	DEP
7-6	CT DEP will streamline the beneficial use process, with consideration given to an exemption from permitting for certain types of materials.	Administrative, Legislative, Regulatory	High	Staff = $	Short term	DEP/ Stakeholders
7-7	CT DEP will establish a streamlined method of regulating waste haulers in order to incorporate reporting and other substantive requirements, along with a simple means of assessing the solid waste fee.	Legislative, Regulatory	High	Staff = $ Other = $$	Short term	DEP/ Stakeholders
7-8	CT DEP will seek authority to establish categories of demonstration projects that would not require traditional permitting.	Legislative, Regulatory	Medium	Staff = $	Mid term	DEP

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7-9	CT DEP will continue to identify activities appropriate for approval by general permit, and devote staff resources to this effort.	Administrative	Medium	Staff = $	Existing	DEP
7-10	CT DEP will develop a procedure to allow the modification of existing permit approvals in order to facilitate improved or modified business operations and enhanced protection of the environment that are needed due to evolving technologies, markets conditions, and environmental concerns.	Administrative, Regulatory	Medium	Staff = $	Mid term	DEP
7-11	Seek amendments to CGS Section 22a-208a(d) to allow municipal transfer stations to accept and do minimal separation of residentially generated construction and demolition waste without requiring full permit modifications and fees.	Legislative, Regulatory	Medium	Staff = $	Short term	DEP
7-12	CT DEP will establish criteria for C&D waste Volume Reduction Facilities to help ensure that more of this waste stream is diverted from disposal.	Administrative	Medium	TBD	Mid term	DEP

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7.13	CT DEP will increase its compliance outreach efforts to develop a more comprehensive and mutually supportive network of communications with land use, public works, and other municipal officials who are directly involved in solid waste activities. CT DEP will take appropriate actions to ensure compliance.	Administrative	High	Staff = $-$$	Short term	DEP/ Municipal and others
7-14	CT DEP will take enforcement actions against recycling law violators as necessary to ensure compliance.	Administrative	High	Staff = $ Other = $$	Existing	DEP/ Municipal and others
7-15	CT DEP will evaluate incentives that would encourage municipalities to take on enforcement responsibilities they are already authorized to do.	Administrative	High	Staff = $	Short term	DEP/ Municipal
7-16	CT DEP will establish civil penalty regulations for violations of recycling laws.	Regulatory	Medium	Staff = $	Short term	DEP

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7-17	CT DEP will evaluate additional tools for taking enforcement actions against violators of the solid waste statutes, regulations and permits.	Administrative	Medium	TBD	Mid term	DEP/ Stakeholders
7-18	CT DEP will ensure that RRF's and other solid waste facilities including landfills and transfer stations comply with CGS Section 22a-220c(b) which requires solid waste facilities periodically to inspect loads delivered to them for significant quantities of recyclables and report such violation back to the municipalities.	Administrative	High	Staff = $$	Mid term	DEP/ Municipal, Authorities, & Private sector

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Objective 8	Funding					
8-1	Adopt a comprehensive, long term, integrated solid waste management funding system to ensure that adequate revenue is available to implement the strategies and achieve the goals of this Plan. The Agency's Solid Waste Advisory Committee will assume a major role in identifying appropriate funding mechanisms. (See 6.3)	Legislative	High	$$$	Short term	DEP/ OPM, Stakeholders
8-1(1)	Expand the current $1.50 fee on waste processed at Connecticut RRFs to all disposed solid waste, including all MSW, C&D debris, and oversized MSW, whether disposed in-state or out-of-state.					
8-1(2)	Capture some portion of the unclaimed bottle/can deposits (escheats) to fund needed solid waste source reduction and recycling/composting programs at the state, regional and local levels.					
8-1(3)	Direct penalty monies from solid waste enforcement actions to municipal and regional recycling and other diversion programs.					
8-1(4)	Increase the Solid Waste Assessment beyond the present $1.50 per ton.					

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

(2) Lead will be responsible for initiating action, Key Partners may be responsible for implementation

(3) Other costs include capital costs, grants, consulting fees, etc.

Table 5-1
Annotated List of Recommended Strategies for Solid Waste Management in Connecticut

Strategy Number	Recommended Strategy	Type of Action	Priority	New Costs (1)	Initiation Time Frame	Responsibility Lead/ Key Partners (2)
		Legislative, Regulatory, Administrative, Other	High, Medium, Low	S = Staff O = Other (3) $, $$, $$$	Short term '06-'08; Mid term '08-'10; Long term after 2010; Or Existing	E.g., DEP, State Agency (TBD), Municipal, Regional Authority, Private Sector, TBD
8-1(5)	Use state bond funds for needed infrastructure projects such as publicly controlled composting facilities and recycling facilities.					

(1) Costs estimates include start up and on-going implementation: $ = ~ 1Fte or < $100,000; $$ = 2-5 Ftes or $100,000 to $500,000; $$$ = >5 ftes or > $500,000

(2) Lead will be responsible for initiating action, Key Partners may be responsible for implementation

(3) Other costs include capital costs, grants, consulting fees, etc.

Appendix A
DEFINITIONS AND ACRONYMS

Definitions

Air Pollution – The presence in the outdoor atmosphere of one or more air pollutants or any combination thereof in such quantities and of such characteristics and duration as to be, or be likely to be, injurious to public welfare, to the health of human, plant or animal life, or to property, or as unreasonably to interfere with the enjoyment of life and property. (CGS Section 22a-170)

Aquifer – A geologic formation, group of formations or part of a formation that contains sufficient saturated, permeable materials to yield significant quantities of water to wells and springs. (CGS Section 22a-354h (6))

Authority – Means the Connecticut Resources Recovery Authority created and established pursuant to this chapter or any board, body, commission, department, officer, agency or other successor thereto. (CGS Section 22a-260 (1))

Ash – Bottom ash, air pollution control residue and other residuals of the combustion process from an incinerator utilized for the combustion of municipal solid waste. (CGS Section 22a-285 (1))

Bulky Waste – Land clearing debris and waste resulting directly from demolition activities other than clean fill. (RSCA Section 22a-208a-1 (10))

Clean Wood – Any wood which is derived from such products as pallets, skids, spools, packaging materials, bulky wood waste, or scraps from newly built wood products, provided such wood is not treated wood as defined in section 22a-209a of the General Statutes or demolition wood. (RSCA Section 22a-208a-1 (11))

Composting – A process of accelerated biological decomposition of organic material under controlled conditions. (CGS Section 22a-207a (1))

Construction and Demolition Waste – Waste building materials and packaging resulting from construction, remodeling, repair and demolition operations on houses, commercial buildings and other structures, excluding asbestos, clean fill, as defined in regulations adopted under section 22a-209, or solid waste containing greater than de minimis quantities, as determined by the Commissioner of Environmental Protection, of (A) radioactive material regulated pursuant to section 22a-148, (B) hazardous waste as defined in section 22a-115, and (C) liquid and semiliquid materials, including, but not limited to, adhesives, paints, coatings, sealants, preservatives, strippers, cleaning agents, oils and tars. (CGS Section 22a-208x (1); RCSA Section 22a-208a (13))

Construction and Demolition Waste Processing Facility – A volume reduction plant, the operations of which involve solely the reduction in volume of construction and demolition waste generated elsewhere. (RCSA Section 22a-208a (14))

Contract Collection – Collection by a private collector under a formal agreement with a municipal authority in which the rights and duties of the respective parties are set forth. (CGS Section 22a-207 (17))

Direct Emissions – Emissions from sources that are owned or operated, in whole or in part, by an entity or facility, including, but not limited to, emissions from factory stacks, manufacturing processes and vents, and company owned or leased motor vehicles. (CGS Section 22a-200 (1))

Greenhouse Gas – Any chemical or physical substance that is emitted into the air and that the Commissioner of Environmental Protection may reasonably anticipate to cause or contribute to climate change, including, but not limited to, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. (CGS Section 22a-115 (1))

Hazardous Waste – Any waste material which may pose a present or potential hazard to human health or the environment when improperly disposed of, treated, stored, transported, or otherwise managed, including (A) hazardous waste identified in accordance with Section 3001 of the federal Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.), (B) hazardous waste identified by regulation by the Department of Environmental Protection, and (C) polychlorinated biphenyls in concentrations greater than fifty parts per million, but does not mean by-product material, source material or special nuclear material, as defined in section 22a-151, or scrap tires. (CGS Section 22a-115 (1))

Indirect Emissions – Emissions associated with the consumption of purchased electricity, steam and heating or cooling by an entity or facility. (CGS Section 22a-200 (5))

Intermediate Processing Center – A facility which can recycle an item or items and market or deliver for reuse the resulting material product or products. Such facilities may be owned by the public or private entities or combinations thereof and may offer service on a state, regional, municipal or submunicipal level. (RCSA Section 22a-208a-1-(a) (18))

Intermediate Processing Facility –A facility where glass, metals, paper products, batteries, household hazardous waste, fertilizers and other items are removed from the waste stream for recycling or reuse. [Often referred to as an Intermediate Processing Center or IPC] (CGS Section 22a-260 (25))

Lamp Recycling Facility – A facility operated to remove, recover or recycle for reuse mercury, metals, phosphorous powder, gases, glass or other materials from fluorescent or high intensity discharge lamps. Such a facility shall be considered a volume reduction plant, as defined in section 22a-207, regardless of the volume of solid waste generated and shall not be subject to the requirements of section 22a-454 provided such facility is operated in compliance with federal law. (CGS Section 22a-209e)

Land Clearing Debris – Trees, stumps, branches, or other wood generated from clearing land for commercial or residential development, road construction, routine landscaping, agricultural land clearing, storms, or natural disasters. (CGS Section 22a-208a-1 (a) (19))

Land Clearing/Clean Wood Processing Facility – A volume reduction plant, the operations of which involve solely the reduction in volume of land clearing debris or clean wood generated elsewhere. (CGS Section 22a-208a-1 (a) (20))

Minor Change – Any change in the facility design, capacity, practice, process or equipment which, in the judgment of the Commissioner, would not significantly alter the nature of the facility or its impact on the environment. (RCSA 22a-208a-1(a) (21))

Mixed Municipal Solid Waste – Municipal solid waste that consists of mixtures of solid wastes which have not been separated at the source of generation or processed into discrete, homogeneous waste streams such as glass, paper, plastic, aluminum or tire waste streams provided such wastes shall not include any material required to be recycled pursuant to section 22a-241b. (CGS Statute 22a-207a (2))

Mixed Municipal Solid Waste Composting Facility – A volume reduction plant where mixed municipal solid waste is processed using composting technology. (CGS Statute 22a-207a (3))

Monocell – A variation of the cell construction method whereby only a single type of solid waste is disposed of in any individual cell. (RCSA Section 22a-209-1)

Mulch – A protective cover of organic material placed over soil to preserve soil moisture, prevent erosion, or promote the growth of plants. (RCSA Section 22a-209-1)

Municipal Authority – The local governing body having legal jurisdiction over solid waste management within its corporate limits which shall be, in the case of any municipality which adopts a charter provision or ordinance pursuant to section 7-273aa, the municipal resource recovery authority. (CGS Section 22a-207 (12))

Municipal Collection – Solid waste collection from all residents thereof by a municipal authority. (CGS Section 22a-207 (16))

Municipal Solid Waste – Solid waste from residential, commercial and industrial sources, excluding solid waste consisting of significant quantities of hazardous waste as defined in section 22a-115, land-clearing debris, demolition debris, biomedical waste, sewage sludge and scrap metal. (CGS Section 22a-207 (23))

Municipality – Any town, city or borough within the state. (CGS Section 22a-207 (11))

New Municipal Solid Waste Disposal Area – A solid waste facility or expansion thereof, other than a vertical expansion, for the disposal of municipal solid waste, for which facility or expansion a completed application under Sections 22a-430 and 22a-208 of the General Statutes is received by the Commissioner after the effective date of Section 22a-209-14 of the Regulations of Connecticut State Agencies. (RCSA Section22a-209-1)

Processed Construction and Demolition Wood – The wood portion of construction and demolition waste which has been sorted to remove plastics, plaster, gypsum wallboard, asbestos, asphalt shingles, regulated wood fuel as defined in section 22a-209a and wood which contains creosote or to which pesticides have been applied or which contains substances defined as hazardous waste under section 22a-115. (CGS Section 22a-208x (2))

Processed Wood – Recycled wood or treated wood or any combination thereof which has been processed at a volume reduction facility permitted under this chapter. (CGS Section 22a-209a (3))

Recycled Wood– Any wood or wood fuel which is derived from such products or processes as pallets, skids, spools, packaging materials, bulky wood waste or scraps from newly built wood products, provided such wood is not treated wood. (CGS Statutes 22a-209a- (1))

Recycling – The processing of solid waste to reclaim material there from (CGS Statutes 22a-207 (7))

Recycling Facility/Recycling Center – Land and appurtenances thereon and structures where recycling is conducted, including but not limited to, an intermediate processing center as defined in section 22a-260. (CGS Statutes 22a-207 (8))

Region – Two or more municipalities which have joined together by creating a district or signing an interlocal agreement or signing a mutual contract for a definite period of time concerning solid waste management within such municipalities. (CGS Statutes 22a-207 (14))

Regional Authority – The administrative body delegated the responsibility of solid waste management for two or more municipalities which have joined together by creating a district or signing an interlocal agreement or signing a mutual contract for a definitive period of time. . (CGS Statutes 22a-207 (13))

Regulated Wood Fuel – Processed wood from construction and demolition activities which has been sorted to remove plastics, plaster, gypsum wallboard, asbestos, asphalt shingles and wood which contains creosote or to which pesticides have been applied or which contains substances defined as hazardous under section 22a-115. (CGS Statute 22a-209a (4))

Residue – Bottom ash, air pollution control residue, and other residues from the combustion process at resources recovery facilities, wood-burning facilities, municipal solid waste incinerators, and biomedical waste incinerators. (RCSA 22a-208a-1 (a) (25))

Resources Recovery Facility – A facility utilizing processes to reclaim energy from municipal solid waste. (CGS Statute 22a-207 (9))

Sludge Processing Facility – A volume reduction plant, the operations of which involve solely the reduction in volume of water treatment, sewage treatment or industrial sludge generated elsewhere. (RCSA Section 22a-208a-1 (1) (27))

Solid Waste – Unwanted or discarded solid, liquid, semisolid or contained gaseous material, including, but not limited to, demolition debris, material burned or otherwise processed at a resources recovery facility or incinerator, material processed at a recycling facility and sludges or other residue from a water pollution abatement facility, water supply treatment plant or air pollution control facility. (CGS Section 22a-207 (3))

"**Solid waste facility"** means any solid waste disposal area, volume reduction plant, transfer station, wood-burning facility or biomedical waste treatment facility. (CGS Section 22a-207 (4))

Solid Waste Disposal Area– Any location, including a landfill or other land disposal site, used for the disposal of more than ten cubic yards of solid waste. For purposes of this subdivision, "disposal" means the placement of material at a location with the intent to leave it at such location indefinitely, or to fail to remove material from a location within forty-five days, but does not mean the placement of material required to be recycled under section 22a-241b in a location on the premises of a recycling facility, provided such facility is in compliance with all requirements of state or federal law and any permits required there under (CGS Section 22a-207 (6))

Solid Waste Management Plan – An administrative and financial plan for an area which considers solid waste storage, collection, transportation, volume reduction, recycling, reclamation and disposal practices for a twenty-year period, or extensions thereof. (CGS Section 22a-207 (15))

Solid Waste Management System – That portion of the overall state solid waste management plan specifically designed to deal with the provision of waste management services and to effect resources recovery and recycling by means of a network of waste management projects and resources recovery facilities developed, established and operated by the authority by contract or otherwise, but not embracing or including any regulatory or enforcement activities of the Department of Environmental Protection in accordance with applicable provisions of the general statutes and as may be referred to in the state solid waste management plan as developed and promulgated by the Commissioner of Environmental Protection. (CGS Statute 22a-260 (23))

Solid Waste Planning Region – Those municipalities within the defined boundaries of regional planning agencies or as prescribed in the state solid waste management plan. (CGS Section 22a-207 (18))

Source-Separated Organic Material Composting Facility – Land, including structures and appurtenances thereon, where the composting of organic material that has been separated at the point or source of generation from non-organic material, takes place. Organic materials means substances composed primarily of carbon and nitrogen, including but not limited to food scraps, food processing residue, soiled or unrecyclable paper and yard trimmings. (RCSA Section 22a-208a-1(a)(31))

Special Wastes – The following wastes, so long as they are not hazardous waste pursuant to section 22a-115 of the General Statutes or radioactive material subject to section 22a-158 of the General Statutes: (1) water treatment, sewage treatment or industrial sludges, liquid, solids and contained gases; fly-ash and casting sands or slag; and contaminated dredge spoils; (2)scrap tires; (3)bulky waste, as defined in this section; (4)asbestos; (5)residue; and (6)biomedical waste. (RCSA Section 22a-208a-1(a)(32))

Transfer Station – Any location or structure, whether located on land or water, where more than ten cubic yards of solid waste, generated elsewhere, may be stored for

transfer or transferred from transportation units and placed in other transportation units for movement to another location, whether or not such waste is stored at the location prior to transfer. (CGS Section 22a-207 (10))

Treated Wood– Wood which contains an adhesive, paint, stain, fire retardant, pesticide or preservative. (CGS Section 22a-209a(2))

Volume Reduction Plant – Any location or structure, whether located on land or water, where more than two thousand pounds per hour of solid waste generated elsewhere may be reduced in volume, including but not limited to, resources recovery facilities and other incinerators, recycling facilities, pulverizers, compactors, shredders, balers and composting facilities. [Commonly referred to as volume reduction facilities or VRFs] (CGS Section 22a-207 (5))

Waste Management Project– Any solid waste disposal and resources recovery area, plant, works, system, facility or component of a facility, equipment, machinery or other element of a facility which the authority is authorized to plan, design, finance, construct, manage, operate or maintain under the provisions of this chapter, including real estate and improvements thereto and the extension or provision of utilities and other appurtenant facilities deemed necessary by the authority for the operation of a project or portion of a project, including all property rights, easements and interests required. (CGS Section 22a-260 (22))

Yard Trimmings – Leaves, grass clippings, weeds, branches up to one (1") inch in diameter and prunings from yards or gardens. (RCSA Section 22a-208a-1 (36))

Acronyms

BRRFOC/TROC – Bristol Resource Recovery Facility Operating Committee/Tunxis Recycling Operating Committee

CAA – Clean Air Act

CCM – CT Conference of Municipalities

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act

CGS – Connecticut General Statutes

COST – Council of Small Towns

CRRA – CT Resource Recovery Authority

CT DEP – CT Department of Environmental Protection

DMMP – Dredged Material Management Plan

ECRRA – Eastern CT Resource Recovery Authority

ECOS – Environmental Commissioners Organization of the States

EPP – Environmentally preferable purchasing

FR – Federal Register

HAP – Hazardous air pollutants

HRRA – Housatonic Resources Recovery Authority

HHW – Household Hazardous Waste

IPC – Intermediate Processing Center

LEED – Leadership in Environmental Energy Design – A U.S. Green Building Council program that promotes "green building" initiatives and programs.

MACT – Maximum Achievable Control Technology (Air quality standards for RRFs)

MSW – Municipal solid waste

NAAQS – National Ambient Air Quality Standards

NEPSI – National Electronics Product Stewardship Initiative

NERC – Northeast Recycling Coalition

NESHAP – National Emission Standards for Hazardous Air Pollutants

NEWMOA – Northeast Waste Management Officials Association

NGO – Non-governmental organization

NPDES – National Pollution Discharge Elimination System

NSPS – New Source Performance Standards

NSR – New Source Review – A type of air quality permit required by new RRFs.

OSW – Office of Solid Waste (Division of U.S. EPA)

PAYT – Pay-as-you-throw – A means of paying for waste disposed based on quantity.

PSA – Public Service Announcement

PSD – Prevention of Significant Deterioration (Air Quality Standards)

PSI – Product Stewardship Initiative

RBRC – The Rechargeable Battery Recycling Corporation (http://www.rbrc.org).

RCRA – Resource Conservation and Recovery Act

RCSA – Regulations of Connecticut State Agencies

RoHS – Regulations on Hazardous Substances – Adopted in the EU, and implemented in California.

RRF – Resources recovery facility

SCRRRA – Southeastern Connecticut Regional Resource Recovery Authority

SIP – State Implementation Plan

SWDA – Special Waste Disposal Authorization

TPY – Tons per Year

USEPA – United States Environmental Protection Agency

VOC – Volatile organic compounds

VRF – Volume reduction facility

WTE – Waste-to-energy

Appendix B
DATA SUMMARY, VALIDATION, AND ASSESSMENT

Introduction

This Appendix summarizes key data assumptions used in the Connecticut's updated Solid Waste Management Plan. A summary of the major components of the State's waste, including municipal solid waste ("MSW"), residual ash from resource recovery facilities ("RRFs"), bulky wastes, recyclables, and special wastes is presented below. This summary is followed by a discussion of data validation and an assessment of Connecticut's process for data gathering and verification.

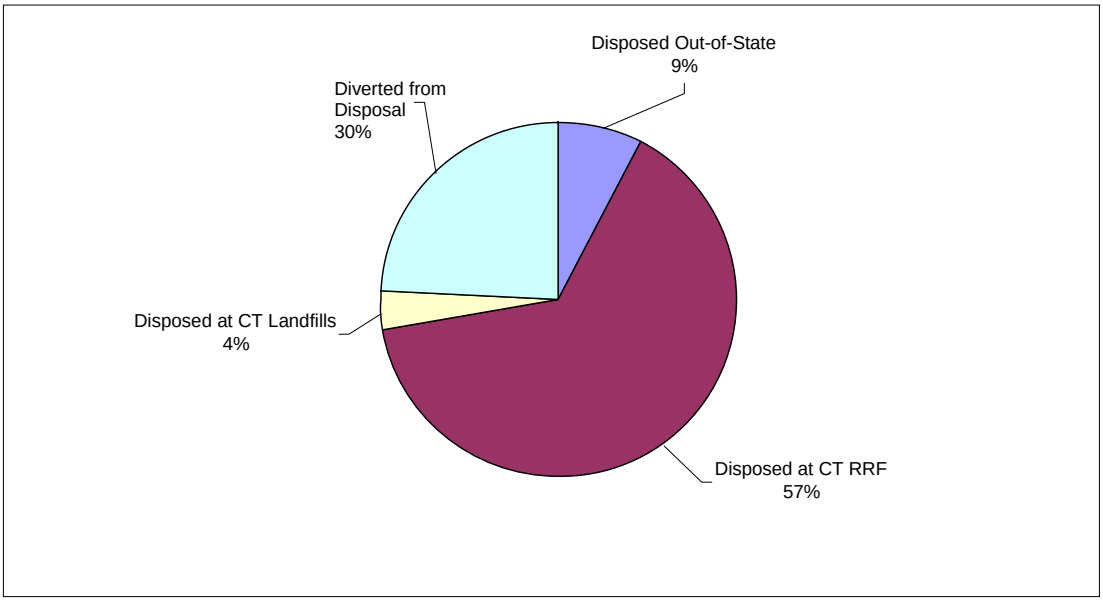
Data Summary

MSW

Section 22a-208a-1 defines MSW as "solid waste from residential, commercial and industrial sources, excluding solid waste consisting of significant quantities of hazardous waste as defined in section 22a-115, land-clearing debris, demolition debris, biomedical waste, sewage sludge and scrap metal."

It is estimated that 3,805,000 tons of MSW was generated in Connecticut in FY2005. The FY2005 MSW statistics were used a baseline for this plan and were projected based on FY2003 actual data reported to the CT DEP plus estimates of additional recycling. Figure B-1 shows estimated for FY2005 the percent disposed in Connecticut (61 percent), the percent disposed out-of-state (9 percent), and the percent diverted from disposal through source reduction, composting, and recycling (30 percent). Of the total amount generated, 57 percent is estimated burned at Connecticut's six MSW RRFs and approximately 4 percent disposed at Connecticut landfills.

Figure B-1
Management of Connecticut MSW – Estimated for FY 2005
[Total Generated: 3,805,000 tons]

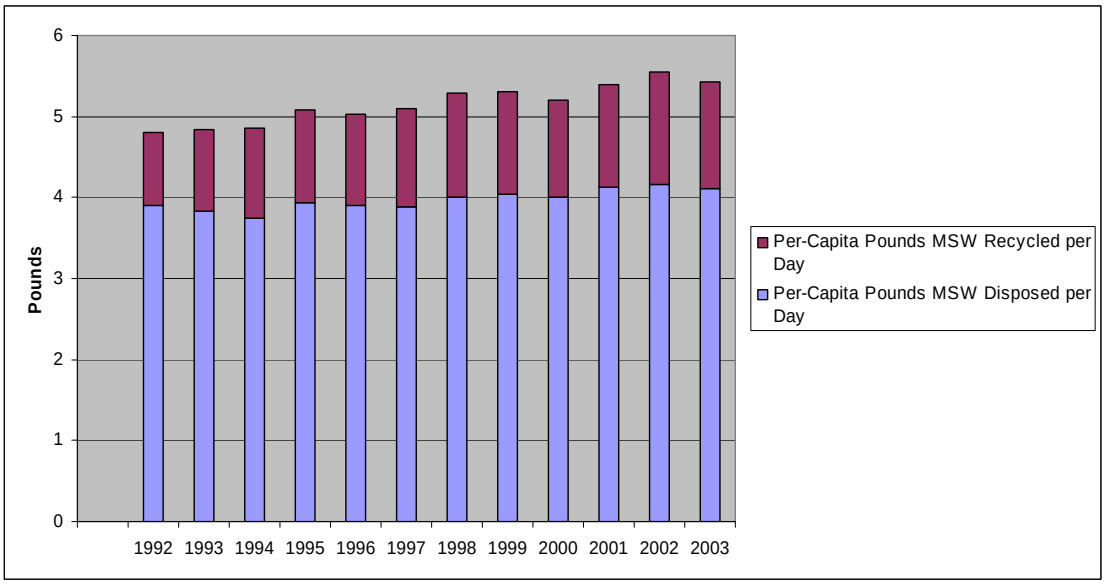


Source: FY 2005 Estimates by R.W. Beck Based on FY2003 Data Compiled by the CT DEP

On a per capita basis in FY 2005, Connecticut was estimated to have generated approximately 1.09 tons/person/year or six pounds/person/day of MSW. The MSW diverted from disposal, at a 30 percent diversion rate, was estimated to account for approximately 0.32 tons/person/year or 1.8 pounds /person/day. Disposed MSW was estimated to have been 0.76 tons or 4.2 pounds/person/day.

To provide an historical perspective, Figure B-2 shows the per capital rates for generation, diversion and disposal from FY 1992 through FY 2003

Figure B-2
Per Capita Pounds Per Day of Connecticut-Generated
MSW Disposed and Recycled
FY 1992-FY2003



Data Source: CT DEP (2002 Data May Contain Some Double Reporting for Recyclables by a CT IPC)

Residue Ash from RRFs

In planning for Connecticut's Solid Waste Management Plan, it was necessary to estimate the amount of residue ash requiring disposal from Connecticut's six MSW RRFs. To develop this estimate, the five-year average of ash disposal from FY 2000 through FY 2004, as reported to the CT DEP, was used. This five-year average is 551,000 tons.

Of this amount, 506,000 tons is disposed in-State and the remaining 45,000 is ash generated by the Bristol RRF and disposed in a landfill in New York State through a contract that expires in FY2009.

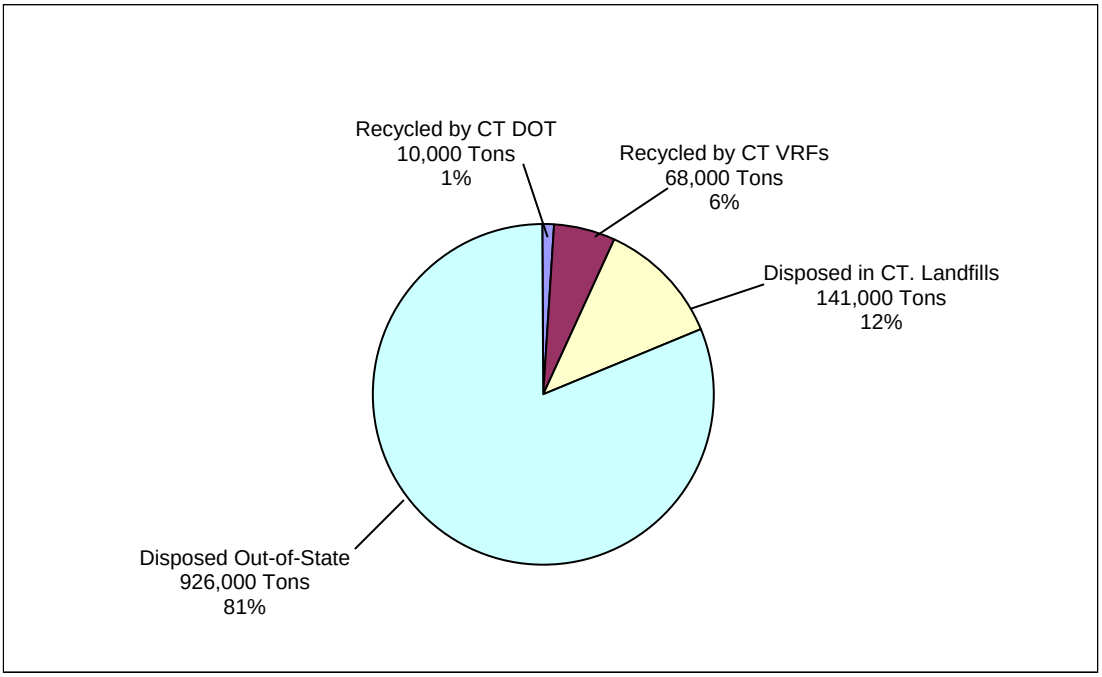
Bulky Wastes

In Connecticut, bulky waste is defined by Title 22A, Section 22a-209-1, to mean "land clearing debris and waste resulting directly from demolition activities other than clean fill." In many other states, the term "bulky waste" refers only to "oversized MSW" and does not include construction and demolition waste which is considered a separate category of waste. Land clearing debris may be considered a third category of waste – although technically in Connecticut it is considered part of "bulky waste".

The data presented below pertains to C&D waste, oversized MSW and land clearing debris. These materials will be referred to as "C&D waste/oversized MSW" throughout this Appendix.

Figure B-3 summarizes "C&D waste/oversized MSW" which includes all large items, including materials going to in-state bulky waste landfills, and materials being processed at construction and demolition volume reduction facilities, as well as materials being taken from transfer stations to out-of-state disposal facilities.

Figure B-3
C&D/Oversized MSW Generated in Connecticut Estimated for FY 2005 (1)
Based on FY2004 Reports Submitted to the CT DEP by C&D Volume Reduction Facilities, Connecticut Landfills, and Connecticut Transfer Station Receiving and Transferring "Bulky Waste"



(1) Excludes clean wood processed at clean wood VRFs and single –material processing facilities; some marketed tons include OCC, which is included in MSW recycled tons. Most marketed tons, however, consist of scrap metal. Does not include most of the clean fill generated and reused or recycled.

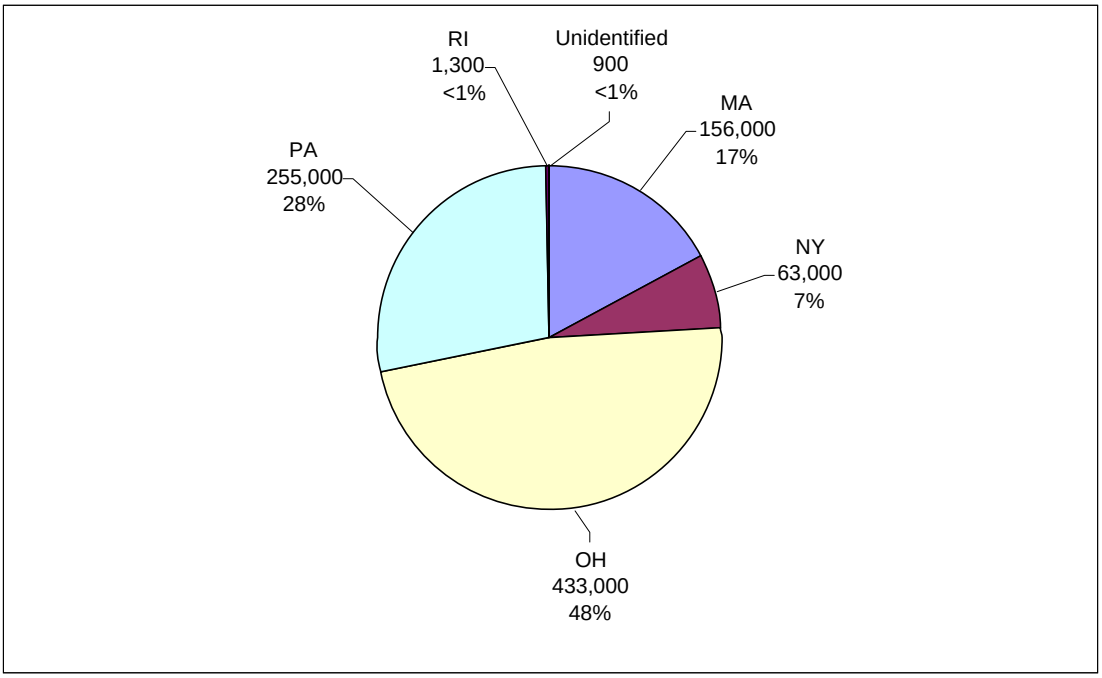
Data Source: FY2004 data from CT DEP; FY2005 estimates by R.W. Beck

As shown in Figure B-3, a total of 1.145 million tons of C&D/Oversized MSW were estimated to be have been disposed (mostly in landfills), or marketed for recycling in FY2005 (based on FY2004 reports submitted by Connecticut C&D volume reduction facilities, Connecticut landfills, or Connecticut solid waste transfer stations). Some of the materials were assumed to be recovered and be available to the recycling markets (mostly scrap metal, and clean wood). For FY 2005, approximately 78,000 tons of C&D/oversized MSW were estimated to have been marketed and recycled, including 10,000 tons of scrap metal recycling by the Connecticut Department of Transportation ("CT DOT"). The data for C&D waste recycling does not include most of the clean fill generated in Connecticut (facilities which process or dispose only clean fill are not currently regulated by the CT DEP). Most clean fill is reused or recycled.

Most of the C&D/Oversized MSW is sent out-of-state and the majority of this waste is disposed. Approximately 909,000 tons were reportedly directed to out-of-state

disposal in FY2004 and this is projected to increase to 926,000 tons in FY 2005. Figure B-4 shows where Connecticut's C&D/Oversized MSW was reportedly delivered.

Figure B-4
FY2005 Connecticut-Generated C&D/Oversized MSW Disposed Out-of-State
Based on Reports Submitted to the CT DEP by
Connecticut C&D VRF's and Connecticut TS's for FY2004



Data Source: FY2004 Data from CT DEP; FY2005 estimates by R.W. Beck

As Figure B-4 shows, almost 50 percent of the C&D/Oversized MSW is exported to Ohio. Pennsylvania is the recipient of nearly 30 percent of this waste. Although some oversized MSW, such as usable furniture, is donated for reuse, virtually all of the oversized MSW generated in Connecticut is disposed.

Recyclables

In Connecticut, Sections 22a-241b-1 to 22a-241b-4 of the Regulations of the Connecticut State Agencies and Sections 22a-241b(c), 22a-256a and Sec. 22a-208v of the Connecticut State Statute designate the following as mandatory materials to recycle:

- Glass and metal food containers;
- Non-residential high grade white office paper;
- Old newspaper ("ONP");
- Scrap metal;
- Old corrugated containers;

- Leaves;
- Grass;
- Waste oil;
- Lead acid storage batteries; and
- NiCd rechargeable batteries.

In addition, there is a ban on disposal of grass and lead acid storage batteries in Connecticut.

These materials, plus non-mandated recyclables are included in the following recycling tables. The estimate of recyclables diverted from disposal in FY2005 was based on FY2003 data reported to the CT DEP and estimates of additional materials diverted from disposal through the State's bottle bill and other commercial recycling.

To estimate the amount of residential recyclables in FY 2005, the amounts of specific materials that were reported by municipalities and processing facilities to have been recycled in FY 2003 were escalated at 1.6 percent per year to reflect the growth in the generation of MSW. Table B-1 presents the amount of these materials estimated to have been recycled in FY 2005.

Table B-1
Tonnages of Materials Estimated Recycled in
Connecticut FY 2005 (1)
(Based on Tonnage Reported to the CT DEP for FY2003

Material	Amount Estimated Recycled (tons)
Newspaper	136,166
OCC	237,944
PET	5,744
HDPE	7,889
Aluminum Cans	1,189
Scrap Metal/Cans	89,019
Yard Waste	239,542
Other Materials	37,572
Total	843,840

(1) Source: FY2003 Data as Compiled by the CT DEP – Projected to FY2005 by R.W. Beck

The "other materials" in Table B-1 include a wide range of products and materials, such as antifreeze, used oil, textiles, and batteries. In addition to the reported amounts shown in Table B-1, an estimate was made of the quantities of other material assumed to have been recycled in Connecticut but not captured by the data reported to the CT DEP. These additional tonnages included estimates of bottle-bill material generated and recovered in Connecticut through the deposit system, and additional commercial

recycling (Franklin and Associates, *The Impact of Source Reduction and Recycling in Connecticut FY 1998 Update*, January 2000). The amounts of additional recyclables estimated to have been recycled in 1998 were escalated by 1.6 percent per year to reflect the growth in the amount of MSW generated in Connecticut. This information is presented in Table B-2.

Table B-2
Projected Tonnages of Additional Material Recycled in Connecticut in FY2005 (not reported to the CT DEP) Including Bottle Bill Materials and Additional Commercial Materials (1)

Material	Estimated in 1998 (tons)	Projected Estimates for FY 2005 (tons)
Corrugated cardboard	137,864	154,066
Office paper	18,077	20,201
Bottle Bill plastic containers	7,949	8,771
Bottle Bill glass containers	37,138	41,503
Bottle Bill aluminum cans	11,863	13,257
Total	212,791	237,799

(1) Source: 1998 Estimates from: *The Impact of Source Reduction and Recycling in Connecticut*; Franklin Associates for CRRA; 2000; Projections by R.W. Beck

Connecticut also diverts waste from disposal through grasscycling and backyard composting program. This program encourages residents not to collect cut grass, but leave it on their lawns and to compost leaves and other organics on-site. In FY 2004, the CT DEP estimated that 49,578 tons of grass and leaves were diverted from disposal. When escalated by 1.6 percent, to account for the growth of MSW, the amount projected to be disposed in FY 2005 is approximately 51,000 tons.

Other Recyclables Materials

In addition to the recyclables designated for recycling and other materials currently diverted from disposal, food waste offers Connecticut the opportunity to significantly increase the current waste diversion rate of 30 percent.

Food Waste

Currently no known data is available regarding the quantity of food waste (residential and non-residential) generated and/or disposed in Connecticut. There is some food waste recovery taking place in Connecticut: in pilot programs; through food donated to soup kitchens and homeless shelters; in home composting programs; and school composting programs. In addition there are anecdotal descriptions of other food waste recovery programs in some cafeterias such as those in colleges. In their FY 2002 annual recycling report, submitted voluntarily to the CT DEP, the Mohegan Sun Casino in Uncasville, Connecticut reported diverting food waste to the Millaras

piggery. However, they have not submitted a report since then and it is not known whether that practice has been continued. In addition, some of the pilot programs' food waste recovered is included in annual municipal recycling reports.

According to U.S. EPA's Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2003, it is estimated that, nationally, food waste comprises 11.7 percent of generated commercial and residential MSW. In Connecticut, this would translate into 445,000 tons of food waste in FY 2005 per year generated. In FY 2003, the following food waste was reported composted/recovered:

- 5,148 tons food residuals processed by New Milford Farms; and
- 612 tons recovered through pilot programs/grease renderers.

In sum, the amount of food waste recovered may be somewhat higher than reports indicate, however food waste is not being composted on a large scale in Connecticut.

In a study completed for the CT DEP in 2001, *Identifying, Quantifying, and Mapping, Food Residuals from CT Businesses and Institutions*, the source-separated organics material generator categories studied in Connecticut were estimated to produce 99,000 to 153,000 tons per year of source-separated organics residuals suitable for composting. Additional food wastes could also potentially be captured from generators that did not meet the size threshold or generator category used for the study, such as restaurants.

Special Wastes

In this section of Appendix B, wastes which are defined as "Special Wastes" under Connecticut Statues are discussed. In addition, certain other wastes which present unusual management challenges, such as electronics, are included here. A more complete discussion of the management of these Special Wastes is presented in Appendix H.

Electronics

The State of Connecticut uses the federal definition found in 40 CFR 100 (Code of Federal Regulations) for used electronics, which reads:

> Used electronics or used electronic devices -- A device or component thereof that contains one or more circuit boards or a cathode ray tube and is used primarily for data transfer or storage, communication or entertainment purposes.

Management of used electronics must comply with the Universal Waste Rule in Connecticut. The universal waste rule requirements are found in Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies ("RCSA"). The Connecticut Universal Waste Rule incorporates 40 CFR 273 in its entirety except for the following provision that is not incorporated: 40 CFR 273.32(a) (3) (regarding an exemption from notification requirements for large quantity handlers of recalled universal waste pesticides).

In additional to electronics, the following waste steams are subject to the Universal Waste Rule in Connecticut:

- Batteries;
- Mercury-containing thermostats;
- Certain pesticides; and
- Lamps (including but not limited to fluorescent, neon and mercury vapor lamps).

The Universal Waste Rule provides a set of streamlined regulations to reduce the regulatory burden by allowing longer time for the storage of the wastes, reduced record-keeping requirements and consolidation off-site without a permit.

The CT DEP does not specifically track the generation or disposal of electronics. According to the Electronics Industry of America ("EIA"), the average American discards 2.5 pounds of used electronics annually. Applying this statistic to the Connecticut population yields an annual quantity of approximately 4,354 tons of discarded used electronics.

The infrastructure for recycling used electronics is comprised of special collection events, drop-off sites at certain transfer stations, and private recycling companies. Special collection events are often hosted and funded by CRRA and other regional authorities and sometimes by municipalities. Authorities and municipalities typically coordinate the events, and contract with a private company to transport and recycle the materials. Collection events are generally open to residents only. Some municipalities allow residents to bring their used electronics for recycling to the municipal transfer station or recycling drop-off site. Businesses typically hire a private company to remove their old electronics. See Appendix H for a more complete description of the management of electronics in Connecticut.

Information on private recyclers of used electronics that are either located in or serve Connecticut may be found at http://www.dep.state.ct.us/wst/recycle/elecrecy.htm. Most municipalities charge residents to recycle their waste electronics.

To date, the only data pertaining to the quantity of used electronics recovered is from the special collection events and from municipalities which recycle electronics at their transfer stations. For 2003, the most recent data available, the CT DEP reports that annual municipal recycling reports and conversations with computer recyclers indicated approximately 427 tons of used electronics were recycled. This probably understates what was actually recovered because it does not include all materials recovered from commercial sources.

C&D Waste/Oversized MSW Materials - (Also see discussion above for "bulky wastes")

As noted above, R.W. Beck estimated that 1,145,000 tons of C&D/Oversized MSW was managed by Connecticut permitted solid waste facilities in FY 2005 (based on data reported to the CT DEP for FY2004). Reported tonnages of C&D wastes in Connecticut indicate that those wastes are generally processed through volume

reduction facilities, or disposed in bulky waste landfills. For more information on tonnages reported, see the "Bulky Waste" section of this Appendix.

Because C&D materials are aggregated with oversized MSW, the exact amount of C&D waste generated and/or recovered in Connecticut is not known. As shown in Figure B-3, in FY 2005 the Plan projects that Connecticut C&D volume reduction facilities will send approximately 926,000 tons of C&D/Oversized MSW out-of-State and approximately 141,000 tons to CT disposal facilities in FY2005. In addition, 68,000 tons of materials will be recovered at Connecticut VRFs and the CT DOT will recycle 10,000 tons of tons of steel from rebar, sheeting, and building structures.

Land Clearing Debris

In Connecticut, land clearing debris is one of the wastes (along with demolition waste) included in the legal definition of "bulky waste." Land clearing debris, according to CT Regulations Title 22A Section 22a-208a-1(20) consists of "trees, stumps, branches, or other wood generated from clearing land for commercial or residential development, road construction, routine landscaping, agricultural land clearing, storms, or natural disasters." The CT DEP does not receive reported data pertaining to the amount of land clearing debris generated each year. However the CT DEP does receive reports on the amount of clean wood received and processed (composted or chipped and sold or distributed as mulch) by Connecticut municipalities and by various clean wood recycling facilities.

Contaminated Soils from Construction Projects

Contaminated soils are typically generated as a result of fuel and chemical spills, leaking oil tanks, and industrial accidents. Owners of property (Responsible Parties) containing contaminated soils generally retain a private contractor to clean up the site. The contractor has the responsibility, and liability, for managing the contaminated soils taken from the site. The four options available to Responsible Parties in Connecticut for managing contaminated soils are to: deliver it to an out-of-state facility; dispose of it at an in-state landfill; deliver it to an in-state treatment facility; and reuse it in accordance with the State's Remediation Standard Regulations. Currently there is no tracking of this type of waste, and no means by which the quantity of contaminated soils in Connecticut can be reasonably estimated. The quantity of this type of waste stream is also expected to fluctuate significantly from year to year.

Dredged Materials

The CT DEP does not currently keep records regarding the quantity of dredged materials generated annually. In an Environmental Impact Statement for Long Island dredging that the EPA and the Corps recently completed, it is estimated that between 500,000 to 1 million cubic yards per year will be dredged from Long Island Sound, although this amount can vary significantly from year to year. This is analogous to

750,000 to 1.5 million tons of moist material. Also, this is for Long Island Sound projects – much of which would be generated off of New York, not Connecticut. A project can produce 10,000 cubic yards per day. This material is tested, then unloaded by barge offshore at one of four designated disposal sites. Some material known to be contaminated (e.g., Bridgeport) has not been dredged as of yet, and there are no plans to do so, as alternatives for properly managing contaminated dredged material are still being researched, and are quite costly.

Animal Mortalities

Animal mortalities are generated under different circumstances and at varying quantities. These can include: road kill; daily or occasional mortalities of farm animals; catastrophic farm animal mortality; and veterinary animal mortalities. The generation and disposal of dead animals is not tracked by the CT DEP and no estimate of the number of animal mortalities in Connecticut is available.

Road Wastes

Road wastes include street sweepings and catch basin cleanings.

Street sweepings are materials such as sand, salt, leaves, debris and litter that are removed from streets, parking lots, and sidewalks in order to prevent these materials from being washed into storm sewers and surface waters. There are no estimates regarding the amount of street sweeping materials generated in Connecticut. The CT DEP developed a guidance document (*Guideline for Municipal Management Practices for Street Sweepings and Catch Basin Cleanings)* for municipalities in order to educate them about the proper handling of these non-contaminated waste streams. Addressing best management practices for street sweeping is part of the requirements for the 130 Connecticut municipalities that need to obtain MS4 permits (Stormwater Management Regulations under NPDES II). The guidance document indicates that:

- In urban areas, 20.25 tons per street-mile of street sweepings are collected per year, on average;
- Municipalities can also take their annual sand application quantities, and assume that 1/3 to ½ of the sand applied in the winter will be collected in the spring.

According to CT DOT, there are 4,065.01 miles of State roads (e.g., roads managed by CT DOT) in Connecticut (excluding exit and entrance ramps). They are classified as follows:

- Rural – 1,527.39
- Small Urban – 2,231.38
- Urban – 235.81

In addition, there are a total of 17,078.03 miles of road under local jurisdiction in Connecticut. These roads are classified as follows:

- Town Rural – 4,589.63

- Town Small Urban – 654.50
- Town Suburban – 11,833.96

According to the CT DOT, urban street sweepings are more contaminated than rural street sweepings. If 20.25 tons per street mile per year figure is applied to CT, then CT could be expected to generate approximately 428,000 tons per year of street sweepings, based on the per-mile generation rate cited above. However, the CT DEP does not track the generation of this waste.

Catch basin cleanings are the materials such as sand, silt, leaves, and debris that accumulate in and are removed from catch basins. This material is usually wetter and has a higher organic content than street sweepings. There is no estimate of the quantity of catch basin cleaning waste generated in Connecticut each year. The CT DEP indicates in their Best Management Practices that approximately 0.1 pounds per catch basin per day is generated. CT DOT does not have an estimate of the number of catch basins that exist in Connecticut.

Household Hazardous Waste (HHW)

Pursuant to the CT DEP permitting conditions, HHW permanent facilities and contractors for the one-day HHW collections are required to report quantities of waste collected. Beginning in 2005, the CT DEP began to receive complete data from these sources. Some of this data has not been submitted and the data that has been submitted has not yet been entered onto a database.

Data limitations for the current reporting format, which includes both participation numbers and HHW types and amount, include the following:

- Inventories tend to include counts of "barrels," whether they are full or not. Permanent facilities tend to have only full barrels, which is much more cost-effective. Temporary facilities tend to have many partially full barrels, and thus inventories of materials collected inherently overstate actual amounts;
- Participation rates (and thus quantities) can fluctuate significantly depending on outside factors such as weather on a collection day, availability of paint recovery program, etc.
- Not all types of HHW are equally toxic or harmful, thus citing a single figure for the number of tons or gallons of HHW can mask these different levels of toxicity.
- A decrease in participation and/or tons can actually be positive because it may be a sign that residents are not consuming more of a HHW product than they need, are finding reuse opportunities, or are using less toxic alternative products.

The CT DEP had made an effort in recent years to collect elemental mercury and mercury-containing devices through collection events at hospitals, schools, dental sweeps, and HHW and/or electronics collection events. The total pounds of mercury reported collected at these events from FY 2000 through FY 2004 are shown in Table B-3.

Table B-3
Pounds of Mercury Collected
2000 through 2004

Year	Thermometer Exchange	School Cleanouts	Dental Sweeps	Total
2000	43.3	306.8	412.0	1,561.9
2001	50.5	87.5	0.0	707.9
2002	10.4	88.8	0.0	99.2
2003	6.0	0.0	0.0	6.0
2004	3.0	0.0	0.0	3.0
TOTAL	113.2	483.0	412.0	2,378.0

As with HHW participation, the pounds of mercury collected may decrease over time, as users of mercury products switch to alternative products. Therefore, data pertaining to pounds of mercury collected in Table B-3 could indicate a successful program.

Sewage Sludge

Sewage sludge is the product of Connecticut's 111 wastewater treatment facilities. It is primarily organic material and is typically de-watered on site. The management of sewage sludge is the responsibility of the municipality or owner of the wastewater treatment facility. In FY 2004, Connecticut's wastewater treatment plants processed more than 547 million gallons of wastewater each day. The de-watered sewage sludge generates approximately 118,000 dry tons de-watered cake per year (processed).

Sewage sludge is handled by incineration, managed on-site/composted or is shipped out of State for disposal. Approximately 74 percent of all facilities in Connecticut send their sludge to one of the State's six incineration facilities located in Hartford, Mattabasett (Cromwell), Naugatuck, New Haven, Waterbury, and West Haven.

The amount of ash residue that is generated as a result of the incineration process is only reported to the CT DEP if the disposal of that ash occurs with the State and the Connecticut disposal facility reports to the CT DEP, making it difficult to quantify total amounts. In FY 2004, four of the six sludge incinerators facilities shipped this waste out-of-State. Approximately 14 percent of the sludge is shipped directly to out-of-State facilities. Approximately 10 percent of the sludge is managed on-site/composted. Less than 2 percent of the sludge is managed in some other manner.

Table B-4 summarizes the status of CT DEP efforts to track the special wastes discussed in this section and provides an estimate of generation and recycling, where these estimates are available.

Table B-4
Summary of the Status of CT DEP Efforts to Track the Generation of Specific Connecticut Special Wastes

Special Waste	Is the Amount Generated Specifically Tracked by the CT DEP?	Estimated Generation	Source
Electronics	No	4,354 TPY	EIA (1)
Food Wastes	No	NA	
C&D Materials	No (2)	NA	
Land Clearing Debris	No	NA	
Contaminated Soils	No	NA	
Dredged Materials	No (3)	NA	
Animal Mortalities	No	NA	
Road Wastes	No		
Street Sweepings	No	428,126 TPY	CT DOT
Catch Basin Cleanings	No	NA	
HHW	Yes	NA	
Sewage Sludge	Yes	547 million gallons of wastewater	
Sewage Sludge	Yes	118,000 dry tons (dewatered) per year	

If these wastes are processed or disposed in a Connecticut permitted solid waste facility or included in a municipal annual recycling report, then the amounts recycled, processed, disposed ,or transferred would be included in recycling, bulky waste or special waste tonnages tracked by the CT DEP. However, the amount generated is not tracked by specific material type.

(1) Electronics Industry of America

(2) The CT DEP does attempt to track Bulky Waste, of which C&D Materials are a part.

(3) The Army Corps of Engineers monitors the generation of dredged materials in Long Island Sound and certain bodies of fresh water

Data Validation

Data Collection

Data pertaining to MSW are gathered by the CT DEP in a variety of ways and Table B-5 summarizes these methods. Reports are submitted to the CT DEP's Bureau of Materials Management and Compliance Assurance (BMM&CA); Bureau of Water Protection and Land Reuse (BWPLR); and the Office of Planning and Program Development (OPPD).

Table B-5
MSW Data Reports Submitted to CT DEP

Form Name	Submitter	Frequency	Main Data Contained
Annual Municipal Recycling Form (submitted to OPPD)	Municipalities	Annual (due August 31)	■ Residential tons of recyclables recycled from residential facilities, names of receiving facilities ■ Quantities recycled from non-residential sources, and receiving facility names ■ Specific efforts to promote home composting and grasscycling (yes/no questions) ■ Education/enforcement activities and events ■ Violations reported to municipality by RRFs/solid Waste (SW) facilities ■ Pay as you Throw (PAYT) program ■ Registered haulers, and their contact info ■ Disposal sites (for MSW, bulky, and special wastes) and amounts disposed
RRF Operational Report (submitted to BMM&CA)	CT RRF Facilities	Quarterly (or monthly depending on permit)	■ Tons CT waste received ■ Tons out-of-State waste received ■ Tons ash produced ■ Tons bypass waste sent out ■ Tons regulated wood fuel received ■ Tons coal burned (Mid-CT RRF) ■ Tons lime used ■ KWH produced (gross and net) ■ Tons metal recovered (before and after combustion) ■ Tons other material recovered before combustion ■ Tons separated non-ash residue disposed elsewhere ■ Pounds steam produced ■ Destination of all materials exiting facility ■ Authorized special waste tons received

Table B-5
MSW Data Reports Submitted to CT DEP

Form Name	Submitter	Frequency	Main Data Contained
RRF SW Tonnage Report (BMM&CA)	CT RRF Facilities	Quarterly (April 30, July 31, Oct 31, Jan 31)	■ Tons delivered by source (e.g., town or regional multi-town facility), under contract ■ Tons delivered by source (e.g., town or regional multi-town facility), via spot market ■ Type of waste (MSW, bulky, authorized special waste, processed demolition wood) ■ Tons of waste, by type, and origin (by State), from out-of-State sources ■ All data is monthly
Landfill Solid Waste Tonnage Report (BMM&CA)	CT Landfills	Quarterly (April 30, July 31, Oct 31, Jan 31)	■ Tons of waste received, by type (MSW, bulky, special, or ash), by town or regional multi-town solid waste facility of origin; ■ Type of special waste ■ All data by month
CT Solid Waste Transfer Station Report (BMM&CA)	CT Solid Waste Transfer Stations	Quarterly (April 10, July 10, Oct 10, Jan 10)	■ Type of waste (MSW, bulky, special, recyclables, received by town or facility of origin ■ Tons of waste (and waste type – MSW, bulky, or special) transferred to disposal or other facilities, and name of facility receiving waste ■ Tons of solid waste transferred to recycling facilities or end markets ■ All data by month
VRF – C&D Waste/SW Facilities (BMM&CA)	VRF Facilities	Quarterly April 10, July 10, Oct 10, Jan 10	■ C&D Tons delivered by waste type (e.g., scrap metal, non-treated lumber, clean wood, clean fill, C&D wastes, demolition wastes, mixed wastes, etc.) ■ Tons MSW recyclables received and processed by type (if permitted to process MSW recyclables) ■ Tons and end destination (disposal or recycling) of materials by type (e.g., clean wood, treated wood, scrap metal, etc.) ■ Origin of C&D materials (e.g., State or multi-town regional solid waste facility) ■ Origin of MSW recyclables by town or multi-town regional solid waste facility of origin

Table B-5
MSW Data Reports Submitted to CT DEP

Form Name	Submitter	Frequency	Main Data Contained
Recycling Transfer Station Form (OPPD)	Recycling Transfer Stations	Quarterly April 10, July 10, Oct 10, Jan 10	■ Tons recyclables received by material type (can be commingled containers/mixed paper) by residential/non-residential, and mixed (residential and non-res.) by town or multi-town solid waste facility of origin. ■ Tons transferred to processing facilities/end markets by material type ■ Tons MSW, bulky waste, special waste, received by town or facility of origin, by month. (if permitted to also transfer solid waste) ■ Tons waste transferred and name/location of disposal or other facility receiving waste (if permitted to also transfer solid waste) ■ All data is monthly
Recycling/ SW Facility Reporting Form (OPPD)	All IPC's and Recycling Facilities	Quarterly (April 30, July 31, Oct 31, Jan 31)	■ Total tons of recyclables received, by material (or commingled containers and mixed paper), from each municipality or multi-town regional SW facility ■ Tons of residue disposed, and disposal site ■ End markets and tons of each commodity recycled
Recycling/ SW Facilities Receiving Only Leaves/Yard Waste and Clean Wood (OPPD)	All facilities that process yard waste or clean wood only	Quarterly (April 30, July 31, Oct 31, Jan 31)	■ Tons of leaves, grass, brush, mixed yard waste and clean wood (including stumps and land clearing) received, by town or multi-town regional facility of origin (by month) ■ Destination of material shipped by month, by category of end product
Scrap Metal Processor Report (OPPD)	Scrap metal dealers	Annually (Calendar Year due by March 31)	■ Tons of scrap metal received, by month, by municipality or State agency (or other political subdivision) of origin (does not request scrap metal quantities by non-municipal generators).
HHW/ CESQG Report (OPPD)	HHW facilities, paint and stain facilities, and one-day event sponsors	Semi-Annual (permanent HHW) Annual – One-day events Quarterly – Paint and stain	■ Participation numbers by town; ■ CESQG's, name and type/quantity of waste delivered ■ Destination manifests, containing waste categories, unit of measure , amounts, destination, and final disposition of material (e.g., Incineration, TSDF, treatment, etc.)

Table B-5
MSW Data Reports Submitted to CT DEP

Form Name	Submitter	Frequency	Main Data Contained
Sewage Sludge Reporting – Monthly Operating Report (submitted to BWPLR)	Waste Water Treatment Plant	Monthly to annual, depending on size of facility.	■ Amount of sludge generated, and where sludge is disposed

In addition, the CT DEP receives annual Newsprint user reports from newspaper publishers and printers reporting the amount of recycled newsprint used and annual directory publisher reports reporting amount of recycled directory paper used and the tonnage (and percent) of directories retrieved for recycling. These reports are not part of the recycling database, but are managed by the CT DEP.

State agency reports are also submitted annually to the CT DEP (FY data due on October 1st), indicating recycling programs and quantities (if known). This is to ensure that State agencies are still complying with recycling mandates. These data are thought to be relatively accurate from buildings where State agencies manage the building directly or hire a contractor to manage the building. CT DEP reports that offices that are in leased office space are less likely to be in compliance with recycling regulations.

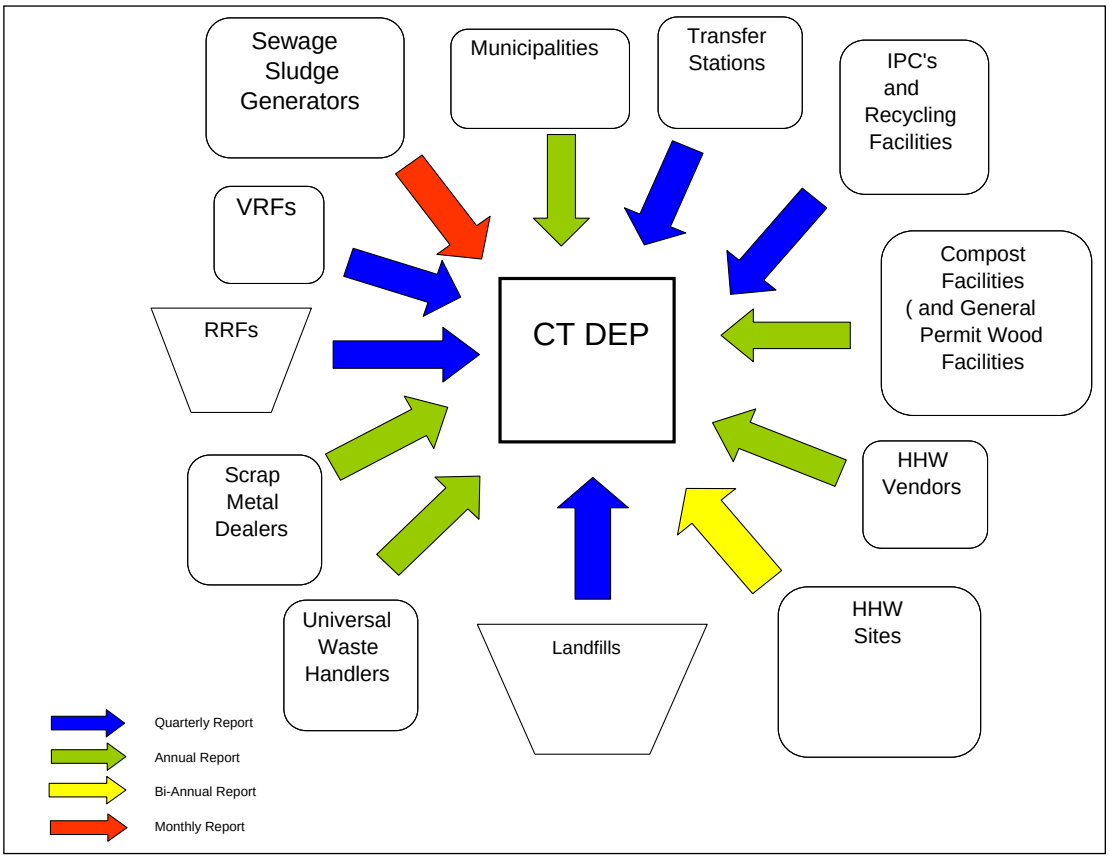
If solid waste goes directly from a generator to a non-reporting destination (i.e. out-of-State facility, end-user, etc.), the CT DEP does not receive this data unless a municipality solicits this information and includes it in their annual municipal recycling report. Most municipalities do not collect this data.

CGS Section 22a-208(e) requires that if a municipality or hauler delivers specific recyclables to a recycling facility which is not located in Connecticut, that municipality or collector must notify the CT DEP of the name and address of the owner or operator of such facility and is required to ensure, by contract, that the out of state facility has notice of and complies with the reporting requirements to the CT DEP. The CT DEP indicates that this reporting is not taking place.

There is, however, no similar statute for MSW or other solid waste (i.e. C&D waste, special waste, etc) going to out-of-State facilities. If a municipality has a contract with a hauler taking MSW or other solid waste out-of-State, this will sometimes be indicated on the annual municipal recycling report or quarterly municipal transfer station reports, and the CT DEP will include that data in the calculation of solid waste disposal figures. However, MSW generated by commercial entities may be hauled directly out-of-State, without record. In an attempt to capture this data, the CT DEP proposed legislation requiring haulers transporting waste out-of-State to submit a report to the CT DEP. This legislation was not passed, however.

Figure B-5 shows the type of solid waste or recycling reports the CT DEP receives. (This table does not include State Agencies which submit annual recycling reports nor does it include the newsprint users (newspaper publishers and printers) and directory publishers which submit annual reports regarding recycled content paper used and/or percent of directories recovered). This data is managed by one full-time staff member in the Office of Planning and Program Development and a part-time assistant in the Bureau of Materials Management and Compliance Assurance.

Figure B-5
Type of CT Solid Waste Facilities and Municipalities Reporting to the CT DEP



Data Calculations

The CT DEP's program of solid waste data collection and calculation is guided by Connecticut statutes. Connecticut Statutes Chapter 446d, Section 22a-220(f) stipulate that "It shall be the goal to recycle 25 percent of the solid waste generated in each municipality provided it shall be the goal to reduce the weight of such waste by January 1, 2000, by an additional fifteen per cent [sic] by source reduction as determined by reference to the State solid waste management plan established in 1991, or by recycling such additional percentage of waste generated, or both." This effectively puts the combined recycling and source reduction rate goal at 40 percent.

The CT DEP's methods for developing standard reports are described below. In addition, the CT DEP generates more targeted solid waste or recycling reports in response to requests for information received from other government agencies, from business and industry, and from the general public. The standard calculations include:

- MSW generated, disposed, recycled; total tons and tons per capita statewide and town-by-town
- MSW items recycled; tons and tons per capita statewide and town-by-town;
- Comparison of MSW recycling rates (percent and per capita) by material type for towns as compared to other towns of similar population size
- Home composting and grasscycling estimates - tons statewide and town-by-town
- Town specific per capita recycling rates compared year-to-year for five year periods;
- Percentage of Connecticut MSW disposed at RRFs, disposed at LFs; disposed out-of-state; recycled; home composted/grasscycled;
- MSW imported into Connecticut from other states and disposed in Connecticut
- C&D waste/ bulky waste disposed in Connecticut; transferred to out-of-state disposal facilities by Connecticut C&D VRFs and Connecticut transfer stations; recovered for reuse or recycling (do not get data on clean fill) by C&D VRFs or municipalities;
- Special waste disposed in Connecticut disposal facilities or transferred out-of-state by Connecticut transfer stations; VRFs; RRFs, etc
- RRF operation reports – solid waste burned; energy recovered; ash residue tonnage and destination; by-pass waste tonnage and destination; etc.

Waste streams that are not considered MSW are not tracked as closely, because of gaps in data reporting requirements. The CT DEP generally uses Connecticut Department of Public Health figures for Connecticut population to develop per capita estimates. Table B-6 summarizes the Statewide figures for FY 2005 estimated from actual FY2003 and FY2004 data. The CT DEP has been collecting MSW recycling and disposal data since FY1992. FY 2005 has been used in this section because it is the baseline year for assumptions made in the Solid Waste Management Plan.

Table B-6
Estimated for FY 2005 Based on FY2003 and FY2004 Reports Submitted to the CT DEP and Additional Sources

	Tons per Year	Tons Per Capita per Year (1)	Pounds Per Capita per Year	Pounds Per Capita per Day
MSW Disposed	2,671,000	0.76	1,520	4.16
CT DEP MSW Recycled	844,000	0.24	480	1.32
MSW Home Composted/Grasscycled(2)	51,000	0.01	20	0.05
Supplemental Recycling (3)	238,000	0.07	140	0.38
Total MSW Generation (4)	3,805,000	1.09 (1.086)	2,172	5.95
Total MSW Recycling (5)	1,133,000	0.32 (0.323)	646	1.77

(1) Connecticut Population Estimate July 1, 2004: 3,503,604; Connecticut Department of Public Health

(2) Estimated based on municipal efforts to promote home composting and grasscycling

(3) Includes Bottle Bill materials and some commercial recycling; Source: CRRA 1998 report *Impact of Source Reduction and Recycling in Connecticut*

(4) Includes MSW Disposed, CT DEP Recycling, Source Reduction and Supplemental Recycling, Combined

(5) Includes CT DEP Recycling, Source Reduction, and Supplemental Recycling

Data Sources: FY2003 and FY2004 reported data from CT DEP; additional recycling estimates from Franklin and Associates; Estimates for FY2005 by R.W. Beck

For FY 2005, the CT DEP-reported data yields an MSW recycling rate of 24 percent. Adding source reduction and supplemental recycling, the rate of diversion from disposal is 30 percent.

Data Verification

After data forms are received, the data are manually input into an Access database by the CT DEP staff or temporary employees.

MSW Disposal

Before reports are run, the CT DEP looks for data outliers to screen potential data problems, such as extreme increases or decreases in waste disposed. In addition, the CT DEP looks for potential double-counting of materials, and cases of reports that do not agree with each other, as well as other checks and balances. Examples include:

- Verifying that amount reported sent by individual transfer station to disposal facilities is equal to the amount the disposal facilities reported receiving from those transfer stations;
- Verifying that the tonnage reported in the RRF quarterly reports equal the amount reported in their operational report - for totals, Connecticut and out-of-state;
- Checking the last page of the municipal recycling reports for the disposal tonnages to capture material that may be going out-of-state - but not reported on transfer station reports;

- Comparing town disposal tonnages to their tonnages last year and to their averages over the past five years;
- Calling out-of-state disposal facilities known to be (or that have historically been) accepting MSW generated in Connecticut (this is based on the Office of Congressional Research Service annual report of "*Interstate Shipment of Municipal Solid Waste"* and the Northeast Waste Management Officials' Association (NEWMOA) annual study of import and export of MSW between NEMOA member states);
- Checking Connecticut border towns, find out who hauls in their towns and call to find additional exported waste (in recent years time has not permitted this step);
- Calculating the amount of material disposed in the Mid-Connecticut system (Hartford landfill, Mid-CT RRF) from Connecticut towns - This includes accounting for:
  - Bypass waste; process residue; non-processibles
  - Subtracting out metals recovered pre-combustion; and
  - Estimating pre-combustion iron actually recycled (i.e. some residue comes back to the RRF as result of processing the pre-combustion metal).

The CT DEP calculates a per-capita MSW disposal rate for the State overall, as well as for each municipality. The rate consists of tons of MSW disposed/population. This calculation is accurate to the extent that MSW data collected is complete. This calculation does not address C&D waste.

In addition to Connecticut MSW disposed at Connecticut RRF's and landfills and Connecticut MSW transferred out of State by Connecticut transfer stations and by-passed to out-of-State facilities from Connecticut resource recovery facilities the calculated State overall MSW disposal rate, also takes into account MSW disposed out-of-State by Connecticut recycling facilities and VRF's. The CT DEP tries to eliminate as much double counting as possible.

If per-capita disposal rates are significantly inconsistent with the previous year's calculations, either at the State or municipal level, the numbers receive additional scrutiny.

MSW Recycling

The recycling rate (percent recycled) in Connecticut is calculated only for MSW; the CT DEP does not calculate a percent recycled for special or bulky waste, since complete data for the amount of bulky and special waste generated is not reported. When calculating the MSW recycling rate, the CT DEP does not include metal recovered post-combustion from RRF ash, because ash is not part of the MSW stream. (Based on FY2004 data submitted to the CT DEP 6.8 percent of MSW RRF ash residue was recovered as scrap metal – this does not include the metal recovered from the MSW before it was burned at MidCT RRF)

Checks and balances that the CT DEP conducts in calculating the recycling rate include:

- Analyzing tonnages that may be double counted because they went from one Connecticut recycling facility to another and the receiving facility reported material as coming from a town instead of another recycling facility or from a transfer station; i.e. Multi-town recycling transfer stations and VRF tons marketed, as well as recycling facility tons marketed;
- Ensuring that residue tons reported are due to processing of MSW recyclables, not due to processing C&D materials at a VRF. Residue due to processing MSW recyclables are subtracted, as appropriate, when calculating State recycling rates;
- Checking towns with very high >35 percent or very low <15 percent recycling rates;
- Checking town rates that are 20 percent higher or lower than the town in previous years;
- Comparing current municipal recycling reports with the reports from the previous year to identify any obvious changes to material types or tonnage and calling towns where significant differences occur;
- Comparing amounts of recyclables towns reported sending to processing facilities with the amounts those facilities report receiving from those towns.

In calculating towns' recycling rates, the CT DEP:

- Uses the amount of MSW recyclables municipalities report sending to recycling facilities. From FY2002 on, the total amount of bottles and cans and paper recycled was calculated using the marketed data reported by Connecticut recycling facilities rather than the tonnages reported on the annual municipal recycling reports; municipal data was used for bottles and cans and paper reported sent to non-reporting destinations (i.e. out of state recycling facilities, directly to end markets such as paper mills, etc.);
- Uses the amount of MSW disposal facilities and transfer stations report receiving from each municipality (corrections estimated for municipalities for which MSW disposal numbers appear inaccurate i.e., under-reported or over-reported).

MSW generation is calculated in the following manner:

Tons Generated = Tons Disposed + Tons Recycled + Tons Composted

In the past, the CT DEP did not count home composting/grasscycled as part of the generation rate since, in some circles (i.e. U.S. EPA), this waste is considered "source reduction" (because it never reached the waste stream).

MSW recycling rate is calculated in the following manner:

Percent Recycled = (Tons Recycled+ Tons Composted) /Tons Generated

In addition, the CT DEP calculates additional bulky waste recycling tonnages based on information contained in the annual municipal recycling reports; For this Plan the CT DEP also attempted to calculate C&D waste recycling tonnages, to the extent they are available, from C&D VRF and Connecticut DOT reports. However this information is

not reported consistently and it is difficult to obtain the correct "denominator" – tons of C&D generated, for the reasons described above.

Data Assessment

The assessment of the CT DEP's management of solid waste management data is based on certain principles of data management systems in general. These principles are presented below and then discussed in relation to the current CT DEP data management program.

Principles of Data Management Systems

A robust data management system should provide data which is:

- Complete;
- Accurate;
- Consistent with the institutions vision and goals;
- Systematic;
- Accessible and usable;
- Cost-effective for data supplier and data users; and
- Secure.

Each of these principles is examined below.

Complete

The CT DEP's current data collection system does not appear to provide complete data. Examples of data which is not collected include:

- Materials collected and recycled under the Bottle-bill;
- Lead acid storage batteries collected and recycled through Connecticut's deposit system;
- Commercial recyclables processed out-of-state or at non-permitted Connecticut solid waste facilities, such as:
  - Materials recovered and handled by a broker and/or sent directly to an end market without first passing through a permitted Connecticut solid waste facility;
  - Waste oil not recovered through municipal transfer stations or recycling facilities; and
  - Materials, such as OCC, which are back-hauled from retail chains and warehouse-type stores to out-of-state regional distribution centers or warehouses for baling and recycling.
- Data pertaining to ash generation and disposal from the six sludge incineration facilities (the only data captured by the CT DEP solid waste data base is solid

waste disposed in a Connecticut disposal facility and reported to the CT DEP by that disposal facility);

- Commercially generated scrap metal which is recycled;
- Solid waste which is direct hauled out-of-state for disposal;
- Materials from facilities which are required to report, but either report incompletely or inaccurately or are non-responsive.

In addition, the CT DEP's data management systems have limitations (e.g., the PAMS, a CT DEP system for tracking permits, only allows up to five types of recyclables to be entered; PAMS system doesn't interact with the solid waste database which tracks solid waste tonnages processed through solid waste facilities).

Recommendations for Gathering more Complete Data

First, the CT DEP should make a careful assessment of what data is important, even critical, to its mission of tracking solid waste management in the State. Not all data needs to be collected and analyzed.

Following are some suggestions for capturing certain types of data, if the CT DEP deems this data important to its mission:

- For Bottle Bill Materials: Obtain Statewide sales data for beverages, estimate tons of containers sold in-State, and apply a known return rate (such as Massachusetts' 69 percent), and apply this ratio to average weights to obtain an estimate of various bottle bill materials.
- OCC Backhauls: Survey some warehouse-type stores regarding their OCC management practices (and information pertaining to any other recyclables they recover that are not currently reported). Figures could be extrapolated to other stores based on sales figures or number of employees.
- Estimate lead acid storage battery recycling tonnages based on national figures.

In addition, consider the following actions:

- De-emphasize the importance of capturing all recycling data, and instead focus on per-capita disposal rates. The CT DEP might track municipal recycling, in order to monitor relative progress and assess program effectiveness, but not "chase" exact recycling percentages. Instead, the CT DEP could focus on total tons of disposed-MSW, and disposed-MSW per-capita, as these figures are generally more easily obtained and tracked. Several states (e.g. North Carolina and California) have decided in recent years to track "per capita MSW disposed' and develop disposed waste reduction goals, rather than recycling goals, as they believe that some specific recycling figures will never be known.
- Conduct a waste characterization study to better understand the composition and size of the disposed-MSW and C&D/bulky waste streams. Such a study might also help to identify materials that could be added to existing recycling programs, as well as identify recycling programs that might benefit from supplemental education and outreach, or incentives.

- Increase the CT DEP staff responsible for data management.
- Educate and remind permittees of their responsibilities for submitting solid waste management data to the CT DEP and increase enforcement of reporting requirements.
- Streamline reporting forms to make them more user-friendly.
- Work with other Connecticut agencies and CT DEP bureaus to ensure that all information they receive pertinent to solid waste management is shared.
- Ensure that there are sufficient data elements in the PAMS database for all requested data (for example, if a facility processes 11 types of materials, ensure that there are at least 11 fields available).
- Consider making it mandatory for haulers to report all waste direct-hauled from the point of generation for disposal or recycling out of State or to a non-reporting destination in Connecticut without first passing through a Connecticut permitted solid waste facility. Although haulers are already required to report specific recyclables hauled directly out-of-state to the CT DEP, pursuant to CGS 22a-208e(c), this reporting is not happening.

Accurate

The more accurate data is, the more useful it is. The CT DEP staff spends a considerable amount of time cross-checking data to ensure that there is no double counting, and to avoid other potential errors. However, inaccuracies in the data still arise for various reasons. Sometimes data are inaccurate because respondents are asked to provide data they simply do not have. This results in estimates of varying degrees of accuracy. For example, the CT DEP asks for yard waste tonnages, but it is often collected in terms of cubic yards. (A conversion factor is built into the solid waste database to convert yard waste cubic yards to tonnage; in addition, there are 19 other conversion factors built into the database for other items as well.)

Another cause of inaccuracy is that the legal definition of bulky waste in Connecticut is not consistent with the definition used by many municipalities and other states. This causes facilities to provide inaccurate data, and leads to entire loads being reclassified to another waste type upon entry into another state. Also, because construction and demolition debris are currently managed together, for the most part, along with bulky (i.e. "oversized") MSW, the CT DEP does not have specific data pertaining to the tons of C&D waste, or oversized MSW, or clean wood.

In some cases a processor may believe that the data requested from the CT DEP is proprietary and may not wish to divulge where materials are being sent or the origin of the waste received at the facility, regardless of reporting requirements.

Recommendations for Gathering More Accurate Data

Following are opportunities to address data inaccuracy:

- Continue to cross-check data where necessary.

- Provide some additional easy-to-understand conversion factors for certain waste streams. For example, use standard container sizes used for the waste stream, and provide a factor for various levels of compaction/moisture, etc.
- Develop clear definitions and consistent terminology for waste types, such as for C&D waste (or construction waste, demolition waste), oversized MSW and land clearing debris that are more consistent with municipal and surrounding states' definitions, and are in line with management strategies for those waste streams.
- Develop and publicize policies for protecting proprietary information.

Consistent with the CT DEP's Solid Waste Management Vision and Goals

The CT DEP's solid waste management goals *have been based* on reducing the waste stream by 40 percent. The data that is attempting to be captured currently does fit that goal. However, as described above, there are many "holes" in the data required to calculate progress toward the stated goals.

As the CT DEP develops and/or revises its solid waste management goals, it should revisit the data it is seeking and the means of collecting that data. Tying data directly to the goals and objectives of the Solid Waste Management Plan makes them more logical to those providing the data.

Recommendations for Gathering More Accurate Data that is more consistent with the CT DEP vision and goals

- Ensure that the key data required to measure progress towards identified goals and objectives are gathered in a manner consistent with the data system principles stated above.
- Ensure that key data required for strategic planning and implementation are gathered and available as needed.
- Relax data reporting in cases where the data do not directly relate to the State's vision and goals. Simply adding new data requirements or data-gathering activities will unnecessarily consume resources.

Systematic

A data management system should be systematic. This means that the data should be collected and stored in an orderly and logical fashion. The CT DEP's current database system has evolved in a patchwork fashion over many years, resulting in a disjointed system. Anomalies of the current system include:

- The PAMS system does not interface with the recycling database, so the staff person entering recycling data does not have up-to-date data pertaining to the active permitted facilities they should expect to hear from.
- In the PAMS system general permit facilities' recyclables and individual permit facilities' recyclables are not assigned the same abbreviations for materials that can be disposed/processed at these facilities.

- Terminology is confusing. Some facilities categorized as "recycling facilities" are actually transfer stations; recycling facilities, IPC's, C&D VRFs, all have volume reduction facility permits

Recommendations for Making the Data System More Systematic

- Develop one integrated database among all the CT DEP bureaus, or at least ensure they are integrated. The database developer should ensure that all bureaus are involved in the database development and that their needs are recognized. Managing one database would probably also be more cost-effective than managing separate, non-integrated databases.
- Develop consistent nomenclature and definitions for facilities, facility types, waste stream types, and so on, among the CT DEP's bureaus. This will not only simplify the database, but should help the bureaus within the CT DEP work together more effectively.
- Develop and document system protocol. When data is entered, calculations are made, or reports are run, there should be protocol for indicating where in the process the user is, and in what stage of completion the database is.
- Automate cross-checking to a greater extent, if possible. This will remove an element of subjectivity and ensure a greater degree of quality control;
- Periodically review the system – The data management system should be reviewed every two or three years to ensure that it continues to meet the needs of all data providers and data consumers.
- Broaden use of data system. A more robust data system will be increasing attractive to both the CT DEP employees and the general public.

Accessible, User-Friendly and Useful

Data should be readily accessible to all those who need to use it. All solid waste data should reside in an integrated system, as described above. Currently, the data in the CT DEP's solid waste division is in two databases: (1) the solid waste database (which is in Access) which tracks the tonnages and destinations of solid waste passing through Connecticut permitted solid waste facilities and calculates MSW recycling, disposal, and generation data for the State, and (2) the Waste Engineering and Enforcement Division's ("WEED") permitting database, called PAMS, which is in Oracle. The focus of the PAMS system is to track permitting. The PAMS system and the solid waste database are not integrated. Furthermore, the permitting and enforcement staff do not have direct access to the solid waste database.

According to the CT DEP's MIS Manager, the Department is working toward developing an integrated system that will eventually be shared by all Agency programs, such that each facility will have a common identification number. The program, called FIS (for facility identifiers), will be supported by Sequel, and will eventually take the place of the Unix-based PAMS, and integrate land, air, and water permits.

Recommendations for Making Data More Accessible, User-Friendly and Useful:

- Provide adequate hardware and software support. Currently some key CT DEP waste permitting, enforcement, and recycling staff cannot directly access the solid waste database because of hardware incompatibility.
- Implement user-friendly interfaces. Both CT DEP staff and those stakeholders entering data online should have user-friendly interfaces that are simple, clear, and not too detailed, bur provide the user with the opportunity to "click" for more information, if needed.
- Develop consistent nomenclature. A user-friendly system will allow all users to employ the same terminology and acronyms.
- Increase staff and resources to develop the system and keep it current. The current staff managing data is stretched to the limit.
- Consider broadening availability of some data/information. The CT DEP might post some of the results of their annual analysis online, so that citizens, businesses, municipalities, and solid waste management authorities can track the State's progress toward its solid waste management goals. The CT DEP might also consider posting municipal or regional results. Results should be easily digested (graphic, when possible) and indicate where, relative to the goal, the municipality or region falls. Comparison could also be made against other regions or municipalities with similar characteristics.

Cost-Effective for Data Providers and Users

The current data system(s) do not appear to be efficient for data users because the systems are not integrated, and do not use the same terminology. In addition, the current system is not automated. All data are input manually, and several queries, calculations, and manual cross-checks are necessary to verify data. In some instances, the CT DEP is asking for the exact same information and checking it against different forms (sometimes from the same reporting entity, and sometimes from a different reporting entity). The CT DEP must determine which cross-checking and multiple reporting of the same data is necessary.

Recommendations for Making the Data System More Cost-Effective for Data Providers and Users

- Develop one integrated database.
- Work with facilities and municipalities to understand which data elements are difficult to report. The CT DEP and the reporting entities should seek a mutually agreeable system for reporting and publishing data. For example, recycling and disposal facilities currently must to submit separate reports to the CT DEP and to the municipalities. It might be possible to develop a single report that would satisfy the needs of both parties.
- Consider having quarterly reports due at staggered times, so that data could be entered on an ongoing basis.

- Develop an online database so that municipalities and solid waste management facilities can enter data online. This should save both those who report data and those that enter and publish data significant amounts of time. It is likely that such a system would have to be online, to the CT DEP's system, so that facilities and municipalities do not have to purchase special software.
- Streamline the data reporting process, such that:
  - To the extent possible, data is gathered from the fewest data providers. In CT, these would include obtaining some data from the recycling facilities, RRFs, and landfills, for example, rather than getting the same data from the municipalities.
  - Identify and, where possible, eliminate, duplicative reporting. Currently, some data is provided twice for cross-checking purposes. In many cases it may be possible to eliminate this duplication.
  - Consider having recycling facilities and landfill and resource recovery facilities submit their reports to the CT DEP only, and have the CT DEP add the data to the annual reports submitted by the municipalities, eliminating the facilities' reporting to the municipalities.
  - Consider having municipalities submit only data pertaining to materials that are NOT received by in-State IPC's, recycling facilities, and disposal facilities, as that data is already captured.
  - Consider having quarterly reports submitted in different months, such that the CT DEP staff can update databases on a rolling basis. Almost all data is reported on a monthly basis monthly, but is submitted a quarterly basis. Rotating the months that these reports are due would provide the CT DEP with an opportunity to keep up database entry more effectively.
  - Consider collecting in-depth data on a less frequent basis, perhaps every three to five years, and basic, necessary data on an annual basis. This would streamline efforts for both providers of data, and those in-putting and analyzing data. Alternatively, the CT DEP could focus on one topic each year, asking in-depth information pertaining to a particular goal, and more basic information absolutely necessary to measure the achievement of goals.

Secure

It is important that data be secure so that potentially proprietary information is not compromised. Currently all data in the CT DEP systems is password protected, and there are various levels of password protection for different database-user types. Data is backed up on tape on a nightly basis using a Legato system, and stored off-site at a nearby warehouse on a weekly basis.

Recommendations for Improving the Security of the CT DEP Data System

- Continue to ensure all data is password protected;

- Ensure only authorized users can change certain fields. This is of particular importance if the CT DEP develops an integrated database;
- Continue to backup data daily;
- Continue to store backups off-site at least weekly; and
- Develop a protocol to protect proprietary information.

Appendix C
STAKEHOLDER AND PUBLIC INPUT PROCESS

To ensure that perspectives from a wide variety of stakeholders were included in the development of the amendment to the State Solid Waste Management Plan, the CT DEP provided various opportunities for stakeholder input. These opportunities for the public to provide input included:

- Statewide Public Stakeholder Forum;
- Formation of External Stakeholder Committee, with all meetings open to the Public;
- Formation of a CT DEP Internal Stakeholder Working Group;
- Outreach;
- A series of telephone and personal interviews;
- CT DEP website; P2 View Newsletter; and
- Public Meetings and Public Hearings on the Proposed Amendment to the State Solid Waste Management Plan.

Each of these opportunities is described below.

Statewide Public Stakeholder Forum

At the beginning of the planning process, the CT DEP held a Statewide Public Stakeholder Forum during which almost 200 people provided their input on issues of importance to the development of an effective amendment to the State Solid Waste Management Plan. The Stakeholder Forum was held on June 29, 2005.

Invitations were sent to municipal officials, regional solid waste and recycling programs; resource recovery authorities; environmental groups; community groups, representatives of the solid waste and recycling industries; private citizens; and others. The Stakeholder Forum began with welcoming remarks and an overview of MSW management by the CT DEP. Then, for the rest of the day, participants divided themselves into five discussion groups to focus on the following topics:

- Source reduction;
- Recycling and composting of municipal solid waste ("MSW");
- Disposal of MSW;
- Management of construction and demolition debris, oversized MSW and other Special Wastes; and
- Management of electronic wastes.

In addition, the CT DEP accepted input (via e-mail) regarding solid waste management issues that the public believed were not addressed at the Statewide Public Stakeholder Forum.

Results of the Forum can be found on the CT DEP's website http://www.dep.state.ct.us/wst/solidw/swplan/stakeholder_meeting_results.pdf.

External Stakeholder Committee

The CT DEP recognized that an important component in developing the Plan would be on-going public input. An integral part of the public process was the establishment of an External Stakeholder Committee for the purpose providing input and comment on strategy and policy options. The Committee was not intended to come to consensus on any issue or questions, nor was their participation to be construed as an endorsement of the proposed Plan.

The External Stakeholder Working Group (see Table C-1) included representatives from municipalities and government associations; regional solid waste management authorities; the solid waste management industry; the recycling sector; community and environmental groups; and business/waste generating industries.

From June 2005 through January 2006, meetings were scheduled and were held; the meetings were chaired by the CT DEP and its consultant, R.W. Beck. Initial meetings focused on a particular issue or issues, such as waste generation and diversion data, the data gathering process, recycling, source reduction, special wastes, and disposal capacity. The latter meetings were used to discuss the Draft Plan. The External Stakeholder Committee meetings were open to the public and all attendees (the general public) were provided the opportunity to comment on the issues under discussion. The activities of the External Stakeholder Committee were placed on the CT DEP's website; this included the listing of the Committee members, the meeting schedule and agendas, meeting materials, a summary for each meeting, and submitted comments by Committee members with regard to the preliminary draft Plan.

Table C-1
External Stakeholders Committee

Stakeholder Working Group Member Name	Title	Address
Mr. Jonathan Bilmes	Executive Director	Bristol Resource Recovery Facility Operating Committee 43 Enterprise Drive Bristol, CT 06010
Mr. James Butler	Executive Director	Southeastern CT Council of Governments 5 Connecticut Ave. Norwich, CT 06360
Mr. Gian-Carl Casa	Director of Legislative Services	Connecticut Conference of Municipalities 900 Chapel Street, 9th Floor New Haven, CT 06510
Ms. Marilyn Cruz-Aponte	Administrative Officer	City of New Britain 27 West Main Street New Britain, CT 06051
Mr. Tim DeVivo	Treasurer	Willimantic Waste Paper Co. PO Box 239 Willimantic, CT 06226
Mr. Peter Egan	Director of Environmental Affairs and Development	CRRA 100 Constitution Plaza Hartford, CT 06103-7722
Mr. Richard Goss	Director of Environmental Affairs	Electronic Industries Alliance 2500 Wilson Blvd. Arlington, VA 22201
Ms. Kathleen Hopkins	Global Environmental Manager	UTC 400 Main St. East Hartford, CT 06108
Mr. Robert Jacques	Manager of Development	New England Region Wheelabrator Technologies Inc. 331 Southwest Cutoff Road Millbury, MA 01527
Ms. Faith Gavin Kuhn	Director of Public Information	Connecticut Construction Industry Association 912 Silas Deane Highway Wethersfield, CT 06109
Mr. Cyril May	President CRC	Yale University Recycling Coordinator Dept. of Custodial Services Box 208297 New Haven, CT 06520

Table C-1
External Stakeholders Committee

Stakeholder Working Group Member Name	Title	Address
Ms. Betty McLaughlin	Director of Environmental Affairs	CT Audubon Society at Hartford 118 Oak Street Hartford, CT 06106-1514
Dr. Mark Mitchell	President	CT Coalition for Environmental Justice PO Box 2022 Hartford, CT 06145
Ms. Barbara Moser	Environmental Purchasing Advisor	DAS/Procurement Services Box 150414 165 Capitol Ave. Hartford, CT 06115-0414
Mr. Nicholas H. Mullane	1st Selectman Town of North Stonington	The North Stonington Old Town Hall 40 Main Street North Stonington, CT 06359
Mr. Mike Paine	CT Representative National Solid Waste Management Association	Paine's Inc. PO Box 307 Simsbury, CT 06070
Ms. Kristina Stefanski	Manager of Environmental Compliance and Risk Management	The Stop & Shop Supermarket Company, LLC 1385 Hancock Street Quincy, MA 02169

CT DEP Internal Stakeholder Working Group

The Internal Stakeholder Working Group (see Table C-2) consisted of CT DEP representatives in the areas of Air, Waste and Water Management, and the following programs under the Office of the Commissioner: Office of Long Island Sound Programs, Environmental Justice and Communications. The purpose of this Working Group was to gather those staff that had the professional and technical expertise related to solid waste management and seek their input as to existing conditions, reactions to the CT DEP consultants findings, and solicit their input and recommendations as to how to best manage this type of waste within the planning timeframe.

Table C-2
Members of the CT DEP Internal Stakeholder Working Group

Stakeholder Working Group Member Name	Title	CT DEP Bureau/Division (Note: CT DEP has since reorganized, see website)
Ms. Kathy Alexander	Environmental Analyst 3	Bureau of Waste Management Engineering and Enforcement
Ms. Judy Belaval	Environmental Analyst 3	Bureau of Waste Management Planning, Standards and Remediation
Mr. Jan Czeczotka	Supervising Environmental Analyst	Bureau of Waste Management Planning, Standards and Remediation
Ms. Martha Fraenkel	Environmental Analyst 2	Bureau of Waste Management Engineering and Enforcement
Mr. Matt Fritz	Director	Office of the Commissioner Communications
Mr. Frank Gagliardo	Environmental Analyst 3	Bureau of Waste Management Engineering and Enforcement
Ms. Tessa Gutowski	Management Analyst 3	Bureau of Waste Management Office of Bureau Chief
Mr. Michael Harder	Bureau Chief	Bureau of Waste Management Office of Bureau Chief
Ms. Kim Hudak	Supervising Sanitary Engineer	Bureau of Waste Management Engineering and Enforcement
Mr. Robert Hust	Supervising Environmental. Analyst	Bureau of Water Management Planning and Standards
Mr. Oswald Inglese	Director	Bureau of Water Management Permitting and Enforcement
Mr. Robert Isner	Director	Bureau of Waste Management Engineering and Enforcement
Mr. Robert Kaliszewski	Ombudsman	Office of the Commissioner Planning and Program Development
Mr. David McKeegan	Environmental Analyst 3	Bureau of Waste Management Engineering and Enforcement
Ms. Elsie Patton	Director	Bureau of Waste Management Planning, Standards and Remediation
Ms. Edith Pestana	Planning Specialist	Office of the Commissioner Environmental Justice
Mr. Rick Pirolli	Supervising Air Pollution Control Engineer	Bureau of Air Management Engineering and Technical Services
Ms. Lynn Stoddard	Environmental Analyst 3	Office of the Commissioner Planning and Program Development

Table C-2
Members of the CT DEP Internal Stakeholder Working Group

Stakeholder Working Group Member Name	Title	CT DEP Bureau/Division (Note: CT DEP has since reorganized, see website)
Mr. Kevin Sullivan	Supervising Environmental Analyst	Bureau of Waste Management Engineering and Enforcement
Mr. Calin Tanovici	Sanitary Engineer 3	Bureau of Waste Management Engineering and Enforcement
Ms. Kim Trella	Supervising Environmental Analyst	Office of the Commissioner Planning and Program Development

Outreach

During the planning process beginning in May 2005, the CT DEP conducted a number of outreach activities such as making presentations to groups and held meetings with representatives from governmental, community groups, universities and colleges, business and industry, regional waste management authorities, regional recycling organizations, and the public. Presentations were made to Connecticut Business and Industry Association; the Connecticut Conference of Municipalities; the Capitol Region Council of Governments, the Hartford Neighborhood Environmental Partnership, Haznet (a household hazardous waste regional and local administrators and vendors); the CT DEP's Bureau of Air Management standing committee SIPRAC (State Implementation Plan Revision Advisory Committee); and representatives from Connecticut universities and colleges.

In addition, the CT DEP met with the General Assembly's House Leadership, as well as the Chairs of the Environment Committee. The CT DEP met separately on a number of occasions with the Connecticut Resources Recovery Authority. Finally, the CT DEP met with representatives from the Mashantucket Pequot Tribal Nation and the Mohegan Tribal Nation.

Interviews

The Consulting team also conducted telephone and personal interviews and site visits with individuals involved in managing solid waste in Connecticut. Table C-3 summarizes these interviews. In addition to those persons identified below, discussions were held with numerous Department staff on a variety of topics addressed in this Plan.

Table C-3

Name	Title	Address/Department	Topic(s)
EXTERNAL STAKEHOLDER COMMITTEE MEMBERS			
Mr. Jonathan Bilmes	Executive Director	Bristol RRFOC/ TROC 43 Enterprise Drive Bristol, CT 06010	MSW Disposal
Ms. Marilyn Cruz-Aponte	Administrative Officer	City of New Britain 27 West Main Street New Britain, CT 06051	MSW Disposal
Mr. Peter Egan	Director of Environmental Affairs and Development	CRRA 100 Constitution Plaza – 6th Floor Hartford, CT 06103-7722	MSW Disposal
Mr. Robert Jacques	Manager, Business Development	New England Region Wheelabrator Technologies Inc. 331 Southwest Cutoff Road Millbury, MA 01527	MSW & BW Disposal
Mr. Mike Paine	CT Representative National Solid Waste Management Association	Paine's Inc. PO Box 307 Simsbury, CT 06070	MSW & BW Disposal
OTHER STAKEHOLDERS			
Mr. Mark Bobman	Tunxis Recycling Operating Committee	75 Twinning St. Bristol CT 06010	Recycling
Mr. Tony Deprimo	Recycling, City of Bridgeport	475 Asylum Street Bridgeport, CT 06610	Yard Waste collection/management in Bridgeport
Mr. Paul DiNarrdo	RTI, Danbury	307 White St, Danbury, 06810	Recycling
Mr. Tom DiVivo	Willimantic Waste Paper	P.O. Box 4239, Willimantic, 06226	Recycling
Mr. Michael Flood	Central Naugatuck Valley COG	20 E. Main Street, Waterbury, 06702	Recycling
Mr. Tom Gaffey & Mr. Mike Bzdyra	CRRA	179 Allyn St, Hartford, 06103	Recycling
Ms. Mary Ellen Kowalewski	Capitol Region COG	221 Main Street, Hartford, 06106	Recycling
Mr. Rick Lynn	Litchfield Hills Council of Elected Officials	42 North St., Town Hall Goshen, CT 06756	Recycling
Ms. Carmen Mendez	Recycling Coordinator, City of New Haven		Yard Waste collection/management in New Haven

Table C-3

Name	Title	Address/Department	Topic(s)
Mr. Russ Morin	Maintenance Division CT DOT		Animal mortalities Street sweepings and catch basin cleanings (CT DOT-generated)
Ms. Cheryl Reedy	Housatonic Resource Recovery Authority	Old Town Rd, Rtes 25 & 133 Brookfield Center, CT 06805	Recycling
Mr. Jerry Rollette	Town of Torrington PW Director		Recycling
Mr. Tim Wentzel	Mid-Northeast Regional Recycling Operating Committee	630 Governors Highway S. Windsor CT 06074	Recycling
Mr. Brian West	Public Works issues, especially YW	City of Hartford Department of Public Works	Yard Waste collection/management in Hartford
Mr. Mike Zarba	Highway Department, City of Stamford		Yard Waste collection/management in Stamford Street sweeping/catch basin cleaning
Customer service representative	City of Waterbury		Yard Waste management in Waterbury
Education coordinator	CRRA	Hartford	Recycling education

CT DEP Web Site and P2View Newsletter

The CT DEP maintains a website concerning the development of this proposed Plan. The website contains the activities undertaken by the CT DEP with regards to the development of the Plan. Included are such actions as announcements of the public forum; a listing of the External Stakeholders Committee as well as related Committee work such as meeting notices, agendas, handouts, documents, and meeting minutes; and the posting of the preliminary draft Plan. The website will be updated to post this Proposed Plan, as well supporting information concerning public meeting and public hearing notices. In addition, the CT DEP's newsletter entitled *P2View (Pollution Prevention View)* included a number of articles concerning the on-going process of developing the State Solid Waste Management Plan and kept its 3,000 readers updated and informed.

- The CT DEP website for the Solid Waste Management Plan can be found at:

  http://www.dep.state.ct.us/wst/solidw/swplan/index.htm

- The CT DEP website for the *P2View* can be found at:

  http://www.dep.state.ct.us/wst/p2/

Public Informational Meetings and Hearings

The CT DEP will be holding a series of public meetings and public hearings with all interested parties regarding the Proposed Amendment to the State Solid Waste Management Plan:

- The CT DEP will be holding three public information meetings at the end of July 2006 and the beginning of August 2006;
- The CT DEP will be holding three public hearings at the end of August 2006. Notice of the Public Hearings will be published in the Connecticut Law Journal, in Connecticut newspapers of general circulation, and will be posted on the CT DEP website at: http://www.dep.state.ct.us/wst/solidw/swplan/index.htm.

Appendix D
CURRENT MSW WASTE DIVERSION PRACTICES

Introduction

This Appendix describes the current status of waste diversion options for municipal solid waste ("MSW") in Connecticut. The Solid Waste Management Plan estimates that in FY 2005, Connecticut will divert approximately 1,133,000 tons of waste from disposal. Of this amount, approximately 1,018,000 tons will be diverted through recycling and composting programs, approximately 64,000 tons will be diverted through the bottle bill, and the remaining 51,000 tons will be diverted through backyard composting and grasscycling.

The current flow of recyclable materials from the MSW waste stream is described, including legislation that encourages or mandates certain practices. Also, an assessment is made as to the adequacy of the existing infrastructure and programs. Non-organic recyclables recovered from the MSW stream are described first, followed by organics. The assessment for both materials is provided in one section.

Non-Organic Materials (Traditional Recyclables)

Traditional recyclables include cardboard, glass food containers, metal food containers, newspaper, office paper, scrap metal, storage batteries, waste oil, nickel-cadmium batteries, and beverage containers covered under Connecticut's mandatory beverage container deposit legislation.

Current Flow of Recyclables

Statutes and Regulations

Recycling Mandates

Connecticut's mandatory recycling legislation requiring separation of designated recyclables went into effect on January 1, 1991. Connecticut General Statutes ("CGS") and the Regulations of the Connecticut State Agencies ("RCSA") specify which materials in the solid waste stream are required to be separated for recycling, by everyone who generates this type of waste, and governs how recycling will be implemented in Connecticut. Some of the major sections of recycling law include the following:

> CGS Section 22a-241b required the CT DEP to adopt regulations designating items required to be recycled.
>
> (a) On or before February 1, 1988, the Commissioner of Environmental Protection shall adopt regulations in accordance with the provisions of chapter 54

designating items that are required to be recycled. The commissioner may designate other items as suitable for recycling and amend said regulations accordingly.

(b) Any item designated for recycling pursuant to subsection (a) of this section shall be recycled by a municipality within three months of the establishment of service to such municipality by a regional processing center or local processing system.

(c) On and after January 1, 1991, (1) each person who generates solid waste from residential property shall, in accordance with subsection (f) of section 22a-220, separate from other solid waste the items designated for recycling pursuant to subsection (a) of this section and (2) every other person who generates solid waste shall, in accordance with subsection (f) of section 22a-220, make provision for the separation from other solid waste of the items designated for recycling pursuant to subsection (a) of this section.

New legislation was subsequently passed to address nickel-cadmium ("Ni-Cd") batteries and grass clippings, effectively banning them from disposal.

CGS Sec. 22a-256a requires the recycling of nickel-cadmium batteries contained in consumer products. On and after July 1, 1993, each municipality shall recycle nickel-cadmium batteries contained in consumer products and disposed of in municipal solid waste within three months of the establishment of service to such municipality by a regional processing center or local processing system.

CGS Sec. 22a-208v prohibits grass clippings from disposal at resources recovery facilities or solid waste facilities. (a) On and after October 1, 1995, the Commissioner of Environmental Protection, and on and after October 1, 1997, the Connecticut Resources Recovery Authority, shall provide for a program of public information to promote the recycling of grass clippings by composting at the property where the grass clippings are generated, by allowing the grass clippings to decompose in place or by composting grass clippings at a municipal or commercial composting facility. (c) After October 1, 1998 or six months after the commissioner adopts such regulations, which ever is sooner, no resources recovery facility or solid waste facility, may accept significant quantities of grass clippings for disposal.

Connecticut recycling law required municipalities to enact ordinances and make provisions for these designated materials generated within their borders to be recycled. Responsibility for enforcement was spread among waste haulers or carters ("collectors", per statute), solid waste facilities, municipalities, and CT DEP. For example:

CGS Sec. 22a-220c deals with recycling enforcement by municipalities, haulers, and solid waste facilities. (a) Each municipality, or its regional agent, shall, by mail, notify all collectors registered to haul solid waste pursuant to section 22a-220a of the provisions made for the collection, processing and marketing of items which are required to be recycled pursuant to section 22a-241b or municipal ordinance. After the mailing of such notice, any collector who has reason to

believe that a person from whom he collects solid waste has discarded recyclable items with such solid waste in violation of said section 22a-241b shall promptly notify the municipal agent designated pursuant to section 22a-220 of the alleged violation. Upon the request of the municipality, a collector shall provide a warning notice, by tag or other means, to any person suspected by the collector or municipality of violating separation requirements. A collector shall also assist the municipality to identify any person responsible for creating loads containing significant quantities of recyclable items mixed with solid waste which are delivered to a resources recovery facility or solid waste facility by the collector and detected by the owner or operator of such facility pursuant to subsection (b) of this section. It has been reported that the reporting requirements in this statute are counter productive for collectors in a competitive service environment.

(b) On and after January 1, 1991, the owner or operator of each resources recovery facility or solid waste facility who has reason to believe, upon visual inspection, that a load of solid waste which is delivered to the facility contains significant quantities of grass clippings or significant quantities of any item required to be recycled pursuant to subsection (a) of section 22a-241b shall provide prompt notification of such belief to the driver of the vehicle delivering the load and to the agent of the municipality from which the load originated, designated pursuant to section 22a-220. The owner or operator of each resources recovery facility or solid waste facility shall conduct periodic unannounced inspections of loads delivered to the resources recovery facility or solid waste facility to assist municipalities and the commissioner in accurately assessing compliance with said section 22a-241b and subsection (c) of section 22a-208v. Such owners or operators shall conduct additional inspections upon the request of the commissioner.

Regulations promulgated as a result of the legislation specified which materials in the solid waste stream were to be separated for recycling, by both households and commercial enterprises. The language reads:

RCSA 22a-241b-2 Items to be recycled. (1) The following items to be recycled by each municipality within three months of availability of the service to the municipality by a regional processing center or local processing system: (A) cardboard (B) glass food containers (C) leaves (D) metal food containers (E) newspaper (F) office paper (G) scrap metal (H) storage batteries, and (I) waste oil. (2) After January 1, 1991, no approval to landfill or incinerate the items specified in subdivision (a)(1) of this section may be granted by the Commissioner pursuant to subsection (b) of section 22a-241b-4.

Bottle Bill Legislation

Connecticut's mandatory beverage container deposit legislation (bottle bill) was enacted in 1978 and became effective in 1980. Statutes (Sections 22a-243 through 22a-246 of the CGS) and regulations (Sections 22a-245-1 through 22a-245-6 of the RCSA) prescribe a deposit and refund system for beverage (beer or other malt beverages and mineral waters, soda water and similar carbonated soft drinks) containers sold or offered for sale in Connecticut. The legislation covers labeling;

redemption requirements for dealers and distributors, redemption center registration, handling fees, and penalties for violations.

> CGS Sec. 22a-244 covers the requirements regarding refunds, labeling and design requirements for beverage containers. (a) Every beverage container sold or offered for sale in this State, except beverage containers sold or offered for sale for consumption on an interstate passenger carrier, shall have a refund value. Such refund value shall not be less than five cents and shall be a uniform amount throughout the distribution process in this State.
>
> (b) Every beverage container sold or offered for sale in this State, except beverage containers sold or offered for sale for consumption on an interstate passenger carrier, shall clearly indicate by embossing or by a stamp or by a label or other method securely affixed to the beverage container (1) either the refund value of the container or the words "return for deposit" or "return for refund" or other words as approved by the Department of Environmental Protection and (2) either the word "Connecticut" or the abbreviation "Ct.", provided this subdivision shall not apply to glass beverage containers permanently marked or embossed with a brand name.

Connecticut designated recyclables collected through the bottle bill are required to be recycled. It is interesting to note that material collected through the bottle bill is generally of high quality and contains little contamination and, as a result, bottle bills in Connecticut and the other bottle bill states led to the development of markets for some of the material even before the material was mandated for recycling.

Connecticut recycling and bottle bill legislation provided the seed for a recycling infrastructure to develop in Connecticut that includes collection, hauling, processing and marketing of both designated recyclables and other recyclables. However, the development of Connecticut's recycling infrastructure also required significant State funding and extensive efforts by municipal and regional recycling coordinators, regional resource recovery authorities, CRRA, CT DEP, recycling processors, haulers, as well as others. Connecticut law and permit conditions require extensive reporting to the CT DEP from municipalities and permitted solid waste facilities involved in handling recyclable materials, enabling data gathering and tracking of materials flow. Haulers are not required to report tonnage data to the CT DEP.

Recycling Regions

Regional recycling programs were established (through regional planning agencies, regional waste management authorities, or some regional groupings of municipalities), as a result of the 1991 statutes and solid waste plan to assist member municipalities with recycling contracting and education. Grant funds were originally passed through these recycling regions to help develop recycling programs

Today, however, some of the regional recycling entities have reduced their role in municipal recycling, while some still undertake contracting on behalf of their towns. Several of the committees have executed long-term contracts for recycling with the intermediate processing centers ("IPCs") on behalf of the towns, but in most cases the towns do business directly with the IPCs. Telephone interviews were conducted with

the recycling coordinators and other regional staff familiar with recycling to determine the current role of the regional recycling entities. Table D-1 indicates the recycling regions, towns in the region, and IPCs generally used by the towns in each region. In addition to the listed Recycling Regions, there are a number of towns that do not belong to regions and who market their recyclables independently.

Table D-1
Recycling Regions in Connecticut

Recycling Region	Relationship between Towns and Major Regional Facility Processing Residential Bottles, Cans, Paper	Towns	Major Regional Facility used (for recycling Residential Bottles, Cans, Paper)
Capitol Region Council of Governments	Recycling Committee inactive. Towns contract directly with IPC.	Bolton, Cromwell, E. Granby, E. Hartford, E. Windsor, Ellington, Enfield, Farmington, Glastonbury, Granby, Haddam, Hartford, Hebron, Newington, Rocky Hill, Simsbury, S. Windsor, Suffield, Tolland, Vernon, W. Hartford, Wethersfield, Windsor, Windsor Locks	CRRA Hartford IPC
Central Naugatuck Valley Council of Governments	Recycling Committee handles only issues with electronics recycling and HHW. Towns contract directly with IPC.	Beacon Falls, Bethlehem, Middlebury, Naugatuck, Oxford, Southbury, Thomaston, Watertown, Woodbury	CRRA Hartford IPC
Connecticut River Estuary Regional Planning Agency	Region administers contract with CRRA for towns' recyclables and MSW. Tip fee is charged for both. Plus an 80-cent per ton surcharge on MSW funds regional recycling committee activities, such as regional electronics recycling, permanent HHW collection site, and public education.	Chester, Clinton, Deep River, Essex, Killingworth, Old Saybrook, Westbrook	CRRA Hartford (some through Essex Transfer Station (T.S.) some directly to Hartford IPC

Table D-1
Recycling Regions in Connecticut

Recycling Region	Relationship between Towns and Major Regional Facility Processing Residential Bottles, Cans, Paper	Towns	Major Regional Facility used (for recycling Residential Bottles, Cans, Paper)
Housatonic Resources Recovery Authority ("HRRA")	Regional Authority has a contract with the IPC for processing on behalf of the towns. Three towns use other facilities. Tip fee for recycling is $38.50 per ton, and double that for MSW disposal. Any recycling revenue goes to the HRRA, not back to the towns. HRRA funded solely on this and 50 cent per ton fee on MSW disposal.	Bethel, Bridgewater, Brookfield, Danbury, Kent, New Fairfield, New Milford, Newtown, Sherman, Redding, Ridgefield	RTI Danbury IPC
Litchfield Hills Council of Elected Officials	Region consists of 20 towns from both Litchfield and NW CT COGs. Recycling Committee in advisory role only, and organizes regional HHW collections. Towns contract directly with IPC.	Barkhamsted, Colebrook, Goshen, Harwinton, Litchfield, New Hartford, Norwalk, North Canaan, Salisbury, Sharon, Torrington, Winchester	CRRA Hartford IPC
Mid-Northeast Regional Recycling Operating Committee (ROC)	ROC does cooperative bidding on behalf of municipalities. Have long-term contract for waste paper with a paper dealer. Towns use contract independently, pay their own fees and keep revenue if there is any. Revenue varies with material. Commingled containers go to Willimantic Waste Paper's IPC, no contract, towns deal directly.	Andover, Ashford, Bolton, Chaplin, Columbia, Coventry, Eastford, Mansfield, Tolland, Union, Willington, Windham	Some towns use Willimantic Waste Paper's IPC in Willimantic for both fiber and commingled containers, while others use the Hartford IPC.
Northeast CT Council of Governments	At one time had a regional recycling component – which has been disbanded	Brooklyn, Canterbury, Eastford, Killingly, Plainfield, Pomfret, Putnam, Sterling, Thompson, Union, Woodstock	Most use Willimantic Waste Paper Facility.

Table D-1
Recycling Regions in Connecticut

Recycling Region	Relationship between Towns and Major Regional Facility Processing Residential Bottles, Cans, Paper	Towns	Major Regional Facility used (for recycling Residential Bottles, Cans, Paper)
Southeastern Connecticut Regional Resources Recovery Authority ("SCRRRA")	SCRRRA owns the IPC in Groton and contracts with Willimantic Paper to operate the Groton IPC. Some towns use the IPC and other go directly to WWP. Recycling (bottle and cans) tip fee is $6 per ton. Next year will charge $0 per ton. This is made possible by gains on energy contracts with Covanta RRF in Preston that serves the region. Preston facility does bonding for SCRRRA and approves budget, but SCRRA has its own Board. SCRRA staff also organizes regional electronics recycling and HHW collection for towns.	Branford, East Lyme, Groton, Ledyard, Montville, New London, North Stonington, Norwich, Preston, Sprague, Stonington, Waterford	Most towns use Groton IPC for bottles and cans or , Willimantic Waste Paper in Windham for paper and bottles & cans. All recycled paper goes to WWP's Willimantic facility.
Southwest Connecticut Regional ROC	Do not have a regional recycling coordinator.	Bridgeport, Darien, East Haven, Easton, Fairfield, Greenwich, Milford, Monroe, New Canaan, Norwalk, Orange, Shelton, Stamford, Stratford, Trumbull, Weston, Wilton, Woodbridge	CRRA Stratford IPC

Table D-1
Recycling Regions in Connecticut

Recycling Region	Relationship between Towns and Major Regional Facility Processing Residential Bottles, Cans, Paper	Towns	Major Regional Facility used (for recycling Residential Bottles, Cans, Paper)
Tunxis Recycling Operating Committee ("TROC")	TROC and the Bristol Resource Recovery Facility Operating Committee ("BRRFOC") are sister agencies. Sixteen communities are served – 14 use the services of the BRRFOC and 13 use the recycling services of the TROC; however, all member towns have comprehensive recycling programs. The agencies administer contracts with the participating towns for both MSW disposal ($66 per ton) and recycling ($33 per ton).	Berlin, Branford, Bristol, Burlington, Hartland, Meriden, Morris, New Britain, Plainville, Plymouth, Prospect, Seymour, Southington, Warren, Washington, Wolcott	Berlin IPC Waste Management Recycle America

Recycling Collection Infrastructure

For the purpose of analysis, recyclables in Connecticut can be considered in the following categories:

- Residential State mandatory recyclables (cardboard, glass food containers, metal food containers, newspaper, leaves, grass, scrap metal, lead-acid batteries, waste oil, Ni-Cad batteries). Curbside collection is not required by law.
- Residential State non-mandatory recyclables most commonly collected are PET and HDPE plastic containers, aluminum foil/trays, magazines, mixed paper, milk/juice cartons.
- Container deposit materials containers (generally made of PET plastic, glass, or aluminum) holding carbonated beverages.
- Commercial State mandatory recyclables (cardboard, glass food containers, metal food containers, newspaper, office paper, waste oil, scrap metal, leaves, grass, Ni-Cd batteries, lead acid storage batteries).

Curbside collection programs generally collect recyclables, such as cans, bottles, newspapers and magazines, and most communities with curbside programs also collect some type of plastic bottle and aluminum foil/trays, and some accept mixed

residential paper and milk/juice containers. The particular materials collected are dictated by markets used either directly by the municipality or the markets used by the recycling facility or contracted IPC receiving the municipality's recyclables.

Many municipalities also offer residents optional services to recycle scrap metals, waste motor oil, and storage batteries, either through scheduled special curbside pickup, or access to a transfer station or recycling center that accepts these goods. Most communities provide these services to residents only, although some may also accept commercial waste. The commercial waste policies are different for different towns, as are the fees charged.

To illustrate the range of recyclables collected in curbside programs, Table D-2 summarizes the materials collected in a sample of some of Connecticut's cities and towns.

Table D-2
Curbside Recyclables Collected by Selected Connecticut Cities and Towns

Town	Region	IPC	Curbside Materials Collected									
			GL	PL	AL	ALFL	TIN	ONP	OMG	RMP	OCC	GBL
Hartford[1]	Capitol	CRRA Hartford	X	X	X	X	X	X	X		X	X
New Haven	Individual	WWP, Windham	X	X [2]	X	X	X	X	X	X	X	X
Stamford	SW CT	CRRA Stratford	X	X	X	X	X	X	X	X	X	
Norwalk[3]	SW CT	CRRA Stratford	X	X	X		X	X		X	X	
New Britain	Tunxis	RAA, Berlin	X	X	X	X	X	X	X	X	X	X
West Hartford	Capitol	CRRA Hartford	X	X	X	X	X	X	X		X	X
Bristol	Tunxis	RAA, Berlin	X	X	X	X	X	X	X		X	X
Meriden	Tunxis	RAA, Berlin	X	X	X	X	X	X	X		X	
East Hartford	Capitol	CRRA Hartford	X	X	X	X	X	X	X		X	X
Stratford[5]	SW CT	CRRA Stratford	X	X	X	X	X	X	X	X		
Milford	SW CT	CRRA Stratford	X	X	X	X	X	X				

Legend: GL = glass containers; PL = plastic containers 1 & 2; AL = aluminum cans; ALFL = aluminum foil/trays; TIN = tin food cans; ONP = newspaper; OMG = magazines; RMP = residential mixed paper; OCC = cardboard; GBL = gabletop or aseptic milk and juice cartons

(1) Provides curbside recycling for small commercial, multi-unit residences, and non-profits

(2) Accepts all plastic bottles #1-7

(3) Provides curbside recycling for commercial businesses

(4) Danbury's mobile recycling trailer accepts "glass, plastic and paper", per Danbury city web site. Only town of largest 15 without curbside. Curbside every other week.

In addition to the curbside collection of the recyclables shown in Table D-2, these towns also offer residents the opportunity to drop off other recyclables materials at a local transfer station, public works yard, drop-off center, or landfill. Table D-3 lists the additional items for each of the towns listed in Table D-2.

Table D-3
Recyclables Drop-Off Services for Selected Connecticut Cities and Towns

Municipality	Materials	Drop-off Facility
Hartford	Scrap Metal	CRRA Landfill
	Lead-Acid Batteries, Motor Oil	Public Works Yard
New Haven	Scrap Metal, Motor Oil	Transfer Station (residents only)
Stamford	Scrap Metal	Drop-Off Center
Norwalk	Scrap, Metal, Lead-Acid Batteries, Motor Oil, Curbside materials	Transfer Station
New Britain	Scrap, Metal, Lead-Acid Batteries, Motor Oil, Freon Appliances, White Paper, Phone Books	Transfer Station (residents only)
West Hartford	Scrap Metal, Lead-Acid Batteries, Freon Appliances, office paper	Recycling Center
Bristol	Scrap Metal, Lead-Acid Batteries, Motor Oil, Freon Appliances, Curbside materials	Transfer Station (residents only)
Meriden	Scrap Metal	Bulky Waste Landfill (residents only)
East Hartford	Scrap Metal, Lead-Acid Batteries, Motor Oil, Freon Appliances	Transfer Station (residents only)
Stratford	Scrap Metal, Motor Oil, Freon Appliances, Curbside materials, OCC	Transfer Station (residents only)
Milford	Scrap Metal, Motor Oil, Curbside materials, OCC	Transfer Station (residents only)

Since 2002, the CT DEP has recognized those municipalities with outstanding source reduction and recycling programs by placing them on the Connecticut Municipal Recycling Honor Roll. To date, fifteen towns have been honored and they are listed, along with a summary of their programs in Table D-4.

Table D-4
Municipalities on the Connecticut Municipal Recycling Honor Roll

Municipality	Programs Beyond the Requirements [1]
Cornwall	Reuse programs for polystyrene packaging peanuts, eyeglasses, ink jet cartridges; other programs operated with local non-profit groups.
Granby	Monthly recycling newsletter, 25% of residents have purchased backyard composters. In addition to mandated recyclables, offers opportunity to recycle #1 and #2 plastic, aseptic packaging, textiles, antifreeze, propane tanks, electronics, and mixed paper; operates town swap shop at its transfer station; waste oil furnace in the DPW garage.
Litchfield	Operates a book exchange, In addition to mandated recyclables, offers opportunity to recycle #1 and #2 plastic, magazines, waxed coated beverage containers, clean used clothing, fluorescent lamps, and eyeglasses; actively promotes recycling with weekly press releases, local TV and radio coverage, and annual calendar.
Manchester	In addition to mandated recyclables, offers opportunity to recycle plastics, clothing, mixed paper; offers subsidized composting bins to residents; recycling rate over 46%.
Mansfield	In addition to mandated recyclables, offers opportunity to recycle aerosol and paint cans, televisions and computers, fluorescent bulbs, batteries, antifreeze, brake fluid, and polystyrene peanuts; operates town swap shop; unit-pricing for refuse; residents who are not recycling are fined after 3 warnings; town purchases paper with recycled content.
Middletown	In addition to mandated recyclables, offers opportunity to recycle some plastics, polycoated drink containers, mixed paper, and antifreeze, and block polystyrene; operates town swap shop; town purchases paper with recycled content; beginning large-scale cermicomposting project.
New Britain	Utilizes various town departments to conduct recycling inspections of businesses and institutions (e.g. Health Department includes recycling in inspection of restaurants); budgets for recycling education; In addition to mandated recyclables, offers curbside collection of #1 and #2 plastic and aseptic packaging.
Norwalk	Commercial collection of OCC, mixed paper, and newspaper; curbside pick-up of yard waste April through December; In addition to mandated recyclables, offers opportunity to recycle of antifreeze, batteries and waste oil.
Portland	In addition to mandated recyclables, offers opportunity to recycle #1 and #2 plastic, clothing, and polystyrene packaging; innovative office paper recycling program; unit-pricing for refuse.
Redding	In addition to mandated recyclables, offers opportunity to recycle #1 - #7 plastics, clothing, shoes, magazines, mail, fluorescent bulbs, and expanded polystyrene peanuts; sends out annual flyer; operates swap shop; aseptic packaging, textiles, antifreeze, propane tanks, electronics, and mixed paper.

Table D-4
Municipalities on the Connecticut Municipal Recycling Honor Roll

Municipality	Programs Beyond the Requirements (1)
Salisbury/Sharon	Rigorous checks for recyclables at the transfer station, which receive 90% of the waste generated in the towns; In addition to mandated recyclables, offers opportunity to recycle clothing, shoes, computers, televisions, office paper, Christmas trees, and mixed paper; operates a swap shop; collects paints and stains; innovated computer reuse program.
Somers	Town purchases products with recycled content through regional co-op program; reuse program for toys, furniture, appliances, dishes, and books; checks incoming refuse for recyclables at the transfer station; recycling education for residents and business at the transfer station.
Stonington	Unit pricing for refuse and free recycling services; In addition to mandated recyclables, offers opportunity to recycle #1 and #2 plastic, polycoated drink containers, junk mail, cereal /cookie boxes, and clothes; operates a swap shop for books, toys, and household items; sells compost bins at cost.
Windsor Locks	Rigorous recycling checks by haulers for businesses and residents; public schools have programs to recycle aseptic containers; used clothing collected a Town Hall.

(1) This table presents some examples of the programs in these towns. For a full description of these programs visit the CT DEP website at http://www.dep.state.ct.us/wst/recycle/munihonor.htm.

Residential Material Flow

A wide variety of arrangements exist in Connecticut for moving recyclables from the generators to the stream of commerce. Residential recyclable materials are generally collected by private haulers or carters. Regional recycling coordinators report that very few municipalities have their own trucks and crews for recycling collection. Many communities contract for trash and recycling services, but there are also reports that in some communities the recycling function is handled by an open market system in which each household makes arrangements with its own hauler or self hauls to a recycling drop-off site or transfer station.

Recyclable materials are delivered by the collection trucks either to transfer stations, which are permitted by the CT DEP (most are municipal transfer stations which only accept recyclables or solid waste from their own town) or directly to recycling processing facilities. In many localities, municipal transfer stations also serve as public drop-off centers for the standard household recyclables as well as a variety of other wastes such as motor oil and batteries, yard waste, and bulky items. From the transfer stations, materials are loaded for transfer to their destinations, which can include end markets or recycling processing facilities (IPCs, paper processors, scrap metal dealers, and volume reduction facilities). Material is redeemed through the container deposit law, which includes carbonated beverage containers made of PET plastic, glass and aluminum, is not handled through the system of permitted solid waste facilities. The material is redeemed by residents at stores or "redemption centers" (which are registered by the CT DEP but not required to report redemption data). The redeemed containers are sent to various processors under contract to the beverage distributors directly. The flow of containers and of dollars through this parallel recycling system is not well documented.

Commercial Material Flow

About half of the fifteen largest municipalities in Connecticut allow commercial entities to use their transfer stations. It is assumed that since commercial vehicles would be able to use these facilities for disposal, they would also be able to take advantage of drop-off recycling opportunities. It is possible that some smaller towns also allow commercial entities to deliver recyclables to their transfer stations.

The permitted solid waste facilities in Connecticut which process recyclables provide capacity for both residential and commercial recyclable materials. Residential materials are usually brought to a specific facility that is permitted to handle only residential, and commercial is accepted at a separate part of the facility, or a separate building on the same site, under different terms.

Revenue sharing may be negotiated for the commercial customers. At Recycling Technology Inc ("RTI") in Danbury and Willimantic Waste Paper ("WWP") in Windham, Connecticut, the tipping fee for recyclables is about half of that for MSW, providing an incentive for commercial generators to recycle. However, it is not known how many commercial generators see the revenue benefits of recycling. The IPCs that operate their own hauling companies, RTI and WWP, likely offer customers

a more attractive rate for the collection of commercially generated recyclables than other haulers because they have control over the processing and marketing of the materials. One IPC operator that does not own hauling assets reported that haulers charge commercial customers for recycling services, then sell the material without sharing revenue with the generators. In this case, the haulers are pushing commercial materials into the marketplace, but the only cost savings to the generators are tip fee savings from recycling rather than disposing the materials. There is a sense among the IPC managers and the regional recycling coordinators that not many commercial businesses participate in programs of this type, where recycling has fixed costs and little savings to offset them.

Recycling Facility Capacity

Types and Capacities of Recycling Facilities

In Connecticut, depending on the type, amount, and/or number of waste materials being aggregated or processed a solid waste management/recycling facility may either have an individual permit or be registered under the recycling general permit. The following describes the types of recycling facilities that are permitted through either an individual or general permit.

Individual Permit for Facilities Processing or Transferring Recyclables

Facilities with individual permits process or transfer recyclables in greater volumes, types, and amounts than facilities which have general permits. The different types of individual permits for processing or transferring recyclable include:

- **Intermediate Processing Center ("IPC")** – means a facility which can recycle an item or items and market or deliver for reuse the resulting material product or products. Such facilities may be owned by public or private entities or combinations thereof and may offer service on a State, regional, municipal or sub-municipal level (RSCA 22a-208a-1 (a)(18)). Most of the solid waste facilities permitted as an "IPC" are regional facilities which process only paper and/or bottles and cans.
- **Volume Reduction Plant** – means any location or structure, whether located on land or water, where more than two thousand pounds per hour of solid waste generated elsewhere may be reduced in volume, including but not limited to, resources recovery facilities and other incinerators, recycling facilities, pulverizers, compactors, shredders, balers and composting facilities (GCS 22a-207(5)). Generally, those facilities which process bottles, cans, and paper and which are permitted as a "volume reduction plant" (as opposed to being permitted as an "IPC") also process other materials such scrap metal, construction and demolition waste, etc. Some facilities permitted as a volume reduction plant process only one type of recyclable (other than bottles, can or paper) such as tires, wood waste, fluorescent lamps, etc.
- **Transfer Station** – means any location or structure, whether located on land or water, where more than ten cubic yards of solid waste, generated elsewhere, may be stored for transfer or transferred from transportation units and placed in other

transportation units for movement to another location, whether or not such waste is stored at the location prior to transfer (GCS 22a-207 (10)). Most municipalities have transfer stations with individual solid waste permits and many transfer recyclables as well as solid waste for disposal. Municipal transfer stations usually only transfer waste generated in their own town or city. There are also individually permitted regional recycling transfer stations which transfer recyclables aggregated from many towns.

Table D-5 identifies the major regional recycling facilities found in Connecticut and lists the materials accepted, the design capacity and the annual capacity. These facilities have the design capacity to process a total of 3,375 tons per day, or approximately 1,088,000 tons per year.

Table D-5
Major (by tons processed) Regional Recycling Facilities used by Towns in Connecticut Recycling Regions for recycling Residential Bottles, Cans, Paper)
April 2006

Location	Facility	Materials	Design Capacity (TPD)	Annual Capacity (TPY)
Berlin, CT	Waste Management Recycle America Alliance LLC IPC (Recycling Facility)	Glass Bottles, Al and Fe cans, plastic (HDPE and PET) containers, cardboard, and newspaper; other paper	650	237,250
Danbury, CT	Recycling Technologies, Inc. IPC (Recycling Facility)	Glass bottles, Al and Fe cans, plastic (HDPE and PET) containers, cardboard, magazines, and newspaper	200	62,400
Groton, CT	Southeastern CT Regional Resources Recovery Authority IPC (operated by Willimantic Waste Paper)	Glass bottles, Al and Fe cans, plastic (HDPE and PET) containers, and paper beverage cartons	80 for commingled containers; permit for fiber for an additional 200 TPD pending	24,960

Table D-5
Major (by tons processed) Regional Recycling Facilities used by Towns in Connecticut Recycling Regions for recycling Residential Bottles, Cans, Paper)
April 2006

Location	Facility	Materials	Design Capacity (TPD)	Annual Capacity (TPY)
Hartford, CT	CRRA Hartford Paper IPC (Recycling Facility)	Newspaper, magazines, cardboard, and other paper (discarded mail)	1170	365,040
Hartford, CT	CRRA Hartford Container IPC (Recycling Facility)	Glass bottles, Al and Fe cans, plastic (HDPE and PET) containers, paper beverage cartons	210	65,520
Stratford, CT	CRRA Stratford IPC (Recycling Facility)	Glass bottles, Al and FE cans, plastic (HDPE and PET) containers, magazines, cardboard, newspaper and other paper	250	78,000
Willimantic, CT	Willimantic Waste Paper's IPC (Recycling Facility)	Newspaper, cardboard, glass bottles, Al and Fe cans, plastic (HDPE and PET) containers, paper beverage cartons, office paper, mixed residential paper, scrap metal	554 for paper and 261 tons of other material (scrap metal)	254,280

General Permit Facilities Processing or Transferring Recyclables

In Connecticut, there are several types of facilities that, if meeting certain types of requirements, can obtain a registration under the recycling general permit for operation. The recycling general permit was developed to be less burdensome and to simplify and facilitate the permitting process for facilities that handle a relatively small amount of waste or only one material. There are limited numbers of these type of permitted facilities and many are under private ownership. The General Permit to Construct and Operate Certain Recycling Facilities was issued on September 26, 2002 and expires on September 26, 2007.

These types of facilities include:

- **Single-Item Recycling Facility –** means a solid waste facility where a single type of waste is received and processed and where no more than 100 tons of recyclables are accepted per day. Acceptable materials at this type of facility include paper, plastic containers; and brush and untreated wood.
- **Drop-Site Facility–** means a solid waste facility where (1) source separated solid waste is collected and with the exception of brush, not processed, (2) the capacity of each collection container does not exceed 40 cubic yards, and (3) the number of collection containers does not exceed three per category of paper and glass, metal, plastic and paper food and beverage containers, and two per category of all other categories of recyclable solid waste or scrap tires collected except used electronic and spent lead-acid batteries.
- **Recyclables Transfer Facility –** means a solid waste management facility which is used primarily by haulers, with incidental use by local residents, to transfer recyclable solid waste from collection vehicles into collection containers, and where no processing or sorting of solid waste other than such transfer or compaction is conducted.
- **Limited Processing Recycling Facility–** means a solid waste facility where source separated recyclables are collected and sorted or processed and where no more than 20 tons of such material is accepted each day.

The recycling general permit single-item processing facilities could potentially provide up to additional 1,200 tons per day (although all facilities may not have a design capacity for the maximum 100 tons per day, currently), and the recycling general permit limited processing capacity facilities could potentially provide up to an additional 180 tons per day of processing capacity. However, it is not known if these facilities have a design capacity that reaches the general permit maximum of 20 tons per day.

Recyclables processing capacity, which includes individually permitted facilities and general permitted facilities, appears to be adequate in Connecticut. For example, two processors have indicated that they could expand their capacity if additional material quantities were recovered. RTI is a regional IPC located in Danbury and when contacted, indicated that their facility is operating at about 60 to 65 percent of rated capacity, and could reach 100 percent if there were higher participation in recycling programs. Willimantic Waste Paper officials report that they could double their capacity on their existing site, or install a second shift.

In August 2005, CRRA unveiled plans to update and expand the Hartford IPC container recycling facility which will greatly increase the capacity to 160,000 tons per year which will now include residential mixed paper and a greater variety of bottles and cans. CRRA will enter into a new contract with FCR, the current IPC operator. Under the contract, FCR will finance the construction of a new recycling processing facility that will greatly increase the capacity and the efficiency of the operation, enabling them to process paper and commingled containers in the same building, The new FCR contract will also eliminate CRRA paying a processing fee,

and in fact will result in a tonnage payment to CRRA from FCR, plus a revenue-sharing arrangement, with a net worth to CRRA of $2.7 million. This positive financial arrangement for CRRA will also enable the recycling operation to offset the disposal tipping fees at the Mid-Connecticut RRF by $3 per ton.

Towns which have revenue sharing arrangements with their IPCs or regional authorities will see positive results during times of good market conditions. For example, for 15 years WWP has had a partnership arrangement with 24 municipalities for a sharing of market revenues on a monthly basis when prices are high. WWP also accepts a broad range of materials for recycling from these municipalities, encouraging maximum recycling.

Bottle Bill Material Flow

Bottle bill redemption centers and retailers redeem the nickel deposits and take back bottle bill containers from consumers. From there, bottles and cans are hauled to either distributors or directly to recycling facilities some under contract to the beverage brand owners or to reverse vending machine owners. Bottle bill containers that flow through the bottle bill infrastructure are in high demand by markets and end-users, mostly because the material is remarkably free of contamination compared to curbside collected material. However, information pertaining to the contract terms, tonnages, sources, and end users is very difficult to obtain.

In Connecticut bottle bill containers can be redeemed at retailers which sell those brands and types of beverages and/or at redemption centers registered with the CT DEP. Some retailers and redemption centers maintain banks of "reverse vending" machines, that accept beverage containers (usually identifying them by the bar code), provide the money back to the consumer, and then either crush or shred the material (glass is crushed, aluminum and PET are either crushed or shredded, depending on the technology). The costs of the redemption system are offset by a handling fee of 1.5 cents on each beer container and 2 cents on each soft drink container, paid by the distributors to the retailers or redemption centers.

Consumers pay the 5-cent deposit to the retailers for every carbonated beverage container purchased in Connecticut. If consumers choose not to redeem their containers – to either put them in the trash or recycle them through a curbside program – the "unredeemed deposits" become the property of the beverage distributors. The number of unredeemed containers, and the cash value of the unredeemed deposits, is closely guarded by the beverage industry. It is estimated that the redemption rate for bottle bill containers in Connecticut is similar to that of Massachusetts, which had a redemption rate of approximately 70 percent. Since there is no reporting requirement attached to the Connecticut bottle bill, the CT DEP does not get any data about quantities redeemed nor material recycled. Consequently, the recycling impact and financial impact of the container deposit system cannot be comprehensively evaluated Connecticut State law requires that all glass and metal food and beverage containers be recycled. It is assumed that bottle bill processors are in compliance with these requirements.

Material Markets

At the writing of this Plan (2006), markets for most recyclable commodities are strong, nationwide. The New York/New England region, of which Connecticut is a part, has greater access to a diversity of material markets due to the number of port facilities. For this reason, commodity prices in this region either consistently track, or at times exceed, national commodity price averages. For example, currently the plastic materials, PET, natural HDPE, and colored HDPE, are all at record prices – PET in the high teens (cents per pound), and the HDPE's in the mid to high 20-cent per pound range. These numbers are consistent with national averages. Mixed residential waste paper is currently selling for around 15 dollars per ton in the New York/New England region, which is on the high side of prices nationally for this material.

Late summer prices for steel and aluminum cans are lower than they are in the spring, but most commodity markets experience some slowdowns and price softening toward year end. However, these material prices are still either consistent with, or better than, national averages. The one exception to this may be mixed cullet, which is of very low value.

Public Education and Promotion

Municipalities

A review of the web sites of the 15 largest Connecticut municipalities showed that, generally, municipal recycling education is lacking in efforts to promote recycling to the public and encourage participation. Most of the web sites included basic information about the types of materials to be recycled curbside and how to prepare them, but it was frequently difficult using the web site alone to find out what day recyclables were collected, what a recycling bin looked like, or even whether curbside recycling was offered weekly or every other week. Hartford is a notable exception, providing a six-page, comprehensive printed guide to recycling opportunities and regulations, downloadable from its web site.

Very few web sites stressed the reasons to recycle or the benefits of recycling. Most did mention that recycling was mandatory ("It's the Law"), and several provided the State statute and/or their associated municipal ordinance as evidence, although municipal ordinances were mostly re-iterations of the State statute without much specific information. Several sites claimed that recycling saved taxpayer dollars, apparently a reference to the fact that tipping fees for recyclables are less then for refuse.

None of the web sites visited featured any of the contemporary new recycling educational materials, developed under an adaptation of the concept of "Social Marketing," that use quirky messages, geared toward the values and interests of citizens who may not be motivated by more "traditional", environmentally oriented recycling education. Some excellent social marketing derived message and media items are produced by other states. However these programs generally are resource intensive to implement, requiring both staff and funding resources to implement – both

of which are not currently available in Connecticut. While web sites are obviously only one way to educate the public about recycling, and municipal web sites in particular have a large amount and variety of information to present, they are nonetheless obvious choices for new residents, or those newly motivated to recycle, to look for quick information or links to other information sources. Only a few of the web sites' recycling pages contained links to other resources, the CT DEP, or their regional recycling agencies. It could certainly be true that communities successfully use other outreach methods to communicate the "hows" and "whys" of recycling to residents, but it is difficult to evaluate every one. Web site information could be much improved, and provide guidance as to how to obtain additional materials and information.

CT DEP

The CT DEP maintains a recycling web page that deals comprehensively with a wide variety of recycling topics pertinent to Connecticut resident and businesses:

- http://dep.state.ct.us/wst/recycle/ctrecycles.htm

Regulations, municipal recycling, business recycling, schools/universities and many other recycling topics are covered in detail.

While the information is exhaustive, this can cause some fatigue on the part of site visitors who are looking for quick, basic information. Often these pages require the visitor to read through a significant amount of text to get to the message.

Much of the new research into Social Marketing concepts as they can be applied to environmental issues reveals that guilt-inducing or pessimistic interpretations of messages can backfire, and cause the public to "tune out" rather than to engage in the desired behavior.

While the de-emphasis of environmental messages (specifically negative ones) may be counter-intuitive to environmentalists who want to promote recycling and increase recycling rates, these new campaigns have been shown effective in producing short-term behavior change. Long-term, it may be the case that environmental awareness follows learned recycling behaviors.

The CT DEP does not participate in "contemporary" motivational campaigns to promote recycling that are available free from other states and private sources. It should be noted that while the information may be free, there are costs in the implementation of such a program. Those types of resources that would be necessary have not been made available to the CT DEP. Although, in the 1990s the CT DEP had a robust education and outreach program that extended to school age children to the adult consumer. This program essentially ended with the lack of availability of funding.

Recycling Regions and Authorities

CRRA

The CRRA offers a variety of educational activities through their Hartford and Stratford facilities. CRRA has two museums, the Visitors Center & Trash Museum in Hartford and the Children's Garbage Museum in Stratford. Each museum has a viewing area where visitors can observe the working regional recycling center. Approximately 50,000 people of all ages visit the museums each year.

Educator-led group tours are available at the two museums. Tours include a guided and interactive exploration of the museum exhibits on all aspects of waste management, an opportunity to learn about the working recycling center, and optional hands-on, topic-specific activities. The activity choices for the programs are organized by school grade and age of the visitors.

CRRA also has books and videos about solid waste and recycling topics available to borrow as well as curriculum and loan kits. In addition, CRRA representatives are available to speak at community events and group meetings about solid waste and recycling issues. CRRA has one full-time educator on staff and five part-time.

SCRRRA

The SCRRA Education Center at the Groton IPC provides recycling and solid waste education to area schools and civic groups. Education outreach is available either at the Education Center or, upon request, at area schools. Demonstrations and viewing of the working IPC are available.

TROC

The Tunxis Recycling Operating Committee ("TROC"), through the Bristol Resource Recovery Facility Operating Committee, devotes several web site pages to recycling promotion and education for the towns in their region. They offer brochures, FAQ's, recycling statistics and links to other sites. They also publish recycling information specific to each town in the region. Some of their material may be out of date, for example, their one-page recycling information sheet instructs participants to remove the caps from all plastic bottles, when this has not been necessary for the markets for many years. In February 2006, the TROC announced a new market research effort to better understand factors influencing residential recycling participation rates and make key improvements to increase recycling program participation. In 2006, TROC will be sharing the results of the study with the CT DEP and other recycling regions and municipalities.

HRRA

The Housatonic Resources Recovery Authority launched a new website in January 2006 – which provides in-depth information about recycling in the region and in the member towns. The site features links to each of the member town's individual web site, as well as to other Connecticut resource recovery authorities, recycling information, regional reuse resources, etc. The other regions do not provide recycling web sites.

Stakeholder Roles in Waste Reduction/Recycling Efforts in Connecticut

Stakeholders in Connecticut's waste reduction and recycling efforts include haulers, facilities, municipalities, generators, authorities, and the CT DEP. Each of these stakeholders plays multiple roles in diverting waste from disposal. A summary of the roles of each stakeholder is presented below. A complete description of the responsibilities of each stakeholder under Connecticut law can be found on the CT DEP website at http://dep.state.ct.us/wst/recycle/recyclinglaws.htm.

Haulers

Haulers collect refuse and recyclables. They are required to comply with the State requirements, including registering with any municipality where the hauler collects solid waste. After the hauler has been notified by the municipality of its recycling requirements, the hauler must report any customer discarding designated recyclables with refuse.

Processing Facilities

The facilities that receive and/or process recyclables are described on pages D-16 through D-20. Owners/operators of a RRF or solid waste facility that receives a load of solid waste containing significant amounts of recyclables must notify the hauler and the municipality where the load originated. Furthermore, these owner/operators shall conduct unannounced inspections of loads coming into their facilities. Recycling facilities must keep a record of the amount of solid waste derived from each municipality and the amount of residue apportioned to each municipality.

On a quarterly basis, facilities must report to the CT DEP the amount of designated recyclables received, processed and sold.

Certain wastes are prohibited from disposal, including grass clippings and lead acid storage batteries (which are returned to retailers through a deposit system).

Municipalities

Items designated for recycling must be recycled by the municipality within 3 months of the establishment of a local or regional processing system. Each municipality must make provisions for the separation, collection, processing, and marketing of designated recyclables generated within their boundaries and must make provision for the disposal of solid waste generated within its borders. Municipalities must notify registered haulers of the recycling requirements. Each municipality must designate a municipal or regional recycling person and submit an annual recycling report to the CT DEP on or before August 31.

Generators

Any person who generates solid waste must separate designated recyclables from other waste. The designated recyclables include glass and metal food containers, non-

residential high-grade office paper, newspaper, scrap metal, old corrugated cardboard, waste oil, lead-acid batteries, leaves, grass and Ni-Cd rechargeable batteries. Residents pay for recycling, either through the tax base or fees.

Authorities

Regional recycling programs to assist municipalities with recycling contracting and education. Authorities own or are affiliated with IPCs and may, in some cases, subsidize the operation of IPCs with MSW tip fees. Many regional authorities offer regional collection of electronics and HHW. CRRA has two educational facilities and offers in-school programs. Other authorities offer recycling education on their website, including:

- Central Naugatuck Valley Council of Governments
  http://www.opm.state.ct.us/pdpd3/physical/c&dplan-rec/Waste.htm
- Housatonic Resource Recovery Authority
  http://www.hrra.org/recycling.php
- Tunxis Recycling Operating Committee
  http://www.brrfoc.org/recycling.htm

See page D-5 for more information on the regional authorities.

CT DEP

The CT DEP has responsibility for the planning, program development and implementation, regulatory authority, and data management for source reduction/recycling/composting in the State.

Yard Waste and Food Waste

Legislation

Current legislation specifically addresses grass and leaves. Connecticut enacted legislation in 1995 that placed a disposal ban on grass clippings beginning on October 1, 1998; the legislation was codified into CGS 22a-208v and reads as follows:

> Grass clippings prohibited from disposal at resources recovery facilities or solid waste facilities. (a) On and after October 1, 1995, the Commissioner of Environmental Protection, and on and after October 1, 1997, the Connecticut Resources Recovery Authority, shall provide for a program of public information to promote the recycling of grass clippings by composting at the property where the grass clippings are generated, by allowing the grass clippings to decompose in place or by composting grass clippings at a municipal or commercial composting facility.
>
> (b) The commissioner shall authorize pilot projects, according to standards or guidelines he deems appropriate, under which municipalities may provide for the composting of grass clippings. The commissioner may adopt regulations, in

accordance with the provisions of chapter 54, to establish composting of grass clippings at the property where such clippings were generated as the preferred method of disposal, or at a commercial composting facility, and to allow municipalities to compost grass clippings.

(c) After October 1, 1998, or six months after the commissioner adopts such regulations, whichever is sooner, no resources recovery facility or solid waste facility permitted under this chapter, other than a municipal or commercial composting facility, may accept significant quantities of grass clippings for disposal.

Connecticut made leaves a mandatory recyclable through RCSA Section 22a-24lb-2 lists the items to be recycled. It reads…

(1) The following items are required to be recycled by each municipality within three months of availability of service to the municipality by a regional processing center or local processing system: (A) cardboard, (B) glass food containers, (C) leaves, (D) metal food containers, (E) newspaper, (F) office paper, (G) scrap metal, (H) storage batteries, and (I) waste oil.(2) After January 1, 1991, no approval to landfill or incinerate the items specified in subdivision (a) (1) of this section may be granted by the Commissioner pursuant to subsection (b) of section 22a-24lb-4.

Overview of Yard Waste and Food Composting and Recycling

The components of the infrastructure include the collection infrastructure, the processing infrastructure, and the programs for backyard composting and grasscycling. They are described in more detail below.

Collection Infrastructure

The collection infrastructure for yard waste appears to be largely in place in urban and suburban areas, and less so in rural areas. In rural areas, however, yard debris is often managed on-site or in the neighboring woodlot, or delivered to a drop-off site. Many municipalities offer separate collection of leaves, either bagged, and/or via a leaf vacuum system, although collection methods are not data that the CT DEP tracks. Table D-6 summarizes the yard waste collection and processing programs in some of Connecticut's larger municipalities.

Table D-6
Summary of Larger Municipalities' Yard Waste Processing Programs

City	Collection	Processing/End Use
Bridgeport	Yard waste is collected on recycling schedule (leaves, grass clippings) in brown bag, every two weeks. Usually April through December, longer weather-permitting. Christmas trees also collected at curb. Drop-off site at transfer station, where residents can bring all types of yard waste, including brush.	City crews compost yard waste and chip the woody waste at a municipal site. Use end products in City projects.
Hartford	City DPW collects bagged leaves, curb side, weekly mid-April – May and a fall collection as well (same day as trash) The City also does leaf vacuuming and a drop-off program for residents. Separate drop-off for brush.	Leaves are composted at City Yard, mulch offered to residents (free of charge) or used in City projects. Limbs and brushy waste are delivered to a separate site and ground. Try to give that away – farmers will take, towns in outskirts, use on City properties, give some to residents, etc. Some people do turn it down, not a high quality mulch. City uses in vacant lots to keep down weeds, etc., as well as for fill.
New Haven	Residential collection of yard waste, weekly, April through first week of October, includes brush, leaves. After that, do leaves only, until the first now (end of December). Residents can use brown bags or clean trash barrels. Same day collection for all materials. City does not do leaf vacuuming. Drop-off site available (by coupon, residents receive three per year) – leaves and brush. Site also available to commercial generators for a fee.	Leaves go to a farm (Borrelli) and the City of West Haven (bid out annually, unless authorized by board of Alderman to be a multi-year bid). City purchases some compost back. Greencycle chips the wood. City pays them to process wood and yard waste (annual contract)

Table D-6
Summary of Larger Municipalities' Yard Waste Processing Programs

City	Collection	Processing/End Use
Stamford	Curbside leaf collection (loose, using loaders and trucks, supplemented by vacuum) Mid-November through second week of December. Curbside Christmas Tree collection at curb. Drop-off sites (2) (transfer station and) processing site also available for yard waste. Registered landscapers may also use. Residents can also deliver tree to northern site (and receive a sapling certificate through Environmental Planning Board – City agency) 70,000 cy of leaves per year	40,000-50,000 cy processed at City site. 25,000 to 30,000 cy hauled out of City, typically to a farm. Trees are ground into mulch and mixed in with leaf compost. Compost is given to residents, used in roadside projects/park projects, and some is sold to landscapers. (price ranges from $4 for unscreened to $10 to $13 per cy for screened material. Has been working with vendors, e.g., Agresource, to further process and market.
Waterbury	Every-other-week curbside collection of all types of yard waste including grass in brown bags, seasonal April through February. Includes Christmas trees Also have drop-off site for yard waste (at landfill)	Yard waste is delivered to a farm for composting.

Yard waste and wood generated from storm events, when generated by residents, is generally managed as part of the municipalities' solid waste management program. When generated by the private sector (generally contractors), it is either delivered directly to an appropriate processing facility, or delivered to a transfer station for later delivery to such a processing site.

Processing Infrastructure

In Connecticut, depending on the type of material being processed or collected, and/or the number of materials being collected and/or processed, and the quantity of material being collected and/or processed, a solid waste management facility may either have an individual permit, general permit registration or be a registered leaf composting facility. The following describes the requirements of these types of permits, and the facilities fitting these criteria that process yard waste in Connecticut.

In Connecticut, there are solid waste management facilities that require individual permits, and those which are regulated under a general permit. General permits were developed to make permitting facilities that handle a relatively small amount of waste or only one material, a simple process, such that the permitting process is not overly burdensome. In the case of leaf composting facilities, by an exemption regulation they simply register with the CT DEP. The different types of facilities that handle organic waste that is typically composted or mulched are described below:

Individual Permit Facilities

As described above, individual permit facilities must be solid waste management facilities. The definition of "solid waste management facility", per CGS Chapter 446d Sec. 22a-207, means any solid waste disposal area, volume reduction plant, transfer station, wood-burning facility or biomedical waste treatment facility. In Connecticut, composting is viewed as a volume reduction activity, thus "volume reduction plants" must acquire individual permits.

Volume Reduction Plant

Some VRFs in Connecticut are permitted to process one or more of the following types of organic wastes.

- Clean wood waste (any wood that is derived from such products as pallets, skids, spools, packaging materials, bulky wood waste, or scraps from newly built wood products, provided such wood is not treated wood or demolition wood)
- Land-clearing debris (bulky waste)
- Brush; or
- Other waste (e.g., food waste).

Transfer Stations

Some transfer stations have individual permits that allow them to chip wood. In Connecticut, most of the municipal transfer stations accept the following types of wood wastes and some chip the wood they receive.

- Clean wood waste;
- Land-clearing debris; or
- Brush.

General Permit Facilities

As described above, there are several types of facilities that, if meeting certain types of requirements, can obtain a general permit registration for operation. The General Permit to Construct and Operate Certain Recycling Facilities was issued on September 26, 2002 and expires on September 26, 2007.

These types of facilities processing organics include:

Single-item Recycling Facilities

Acceptable organic materials accepted include brush and untreated wood. Many of these facilities process (e.g., chip) untreated wood waste. The CT DEP uses the following definitions:

- Brush – Tree stumps (which is considered land clearing debris) and cut or broken branches and shrubs; and untreated wood
- Wood to which no adhesives, paints, stains, fire retardants, pesticides, or preservatives have been applied.

Drop-site Facilities

Acceptable organic materials include leaves, grass clippings, and brush. Organic materials must be removed from the site at least once per week. These facilities cannot accept untreated wood.

Recyclables Transfer Facility

In Connecticut recyclables transfer stations may accept leaves, brush, grass clippings, and untreated wood.

Limited Processing Recycling Facilities

Acceptable organic materials include untreated wood, brush and leaves.

Registered Facilities

CGS Section 22a-208i granted the CT DEP's commissioner the right to exempt leaf composting facilities from permit requirements. This statute was passed so that the CT DEP could enable leaf waste composting facilities to develop relatively quickly, in response to leaves becoming a mandatory recyclable item. The statute reads, in part:

> CGS Sec. 22a-208i. Composting of leaves. Regulations. Certain recycling facilities exempt from requirement of permit for solid waste facility. (a) Notwithstanding any provision of this chapter, or chapter 446e or 446k, any facility where the sole business or activity conducted is composting of leaves shall be exempt from the requirements of sections 22a-208a and 22a-430. The commissioner may adopt regulations in accordance with the provisions of chapter 54 concerning facilities for the composting of leaves. Such regulations shall, without limitation, provide for the design, operation and monitoring of and reporting from such facilities.
>
> (b) The commissioner may, by regulations adopted in accordance with chapter 54, exempt categories or classes of recycling facilities from the requirements of said section 22a-208a or 22a-430 provided such exemption would not adversely affect the environment and would advance the objectives of the solid waste management plan adopted and revised under sections 22a-228 and 22a-241a and the municipal solid waste recycling plan adopted under section 22a-241. No person or municipality may operate or continue to operate a recycling facility without permits issued under said section 22a-208a or 22a-430 unless such person or municipality first files with the commissioner a written request for exemption under the regulations adopted under this section.

(c) The provisions of subsection (a) exempting facilities composting leaves and the provisions of subsection (b) exempting recycling facilities from the requirements of section 22a-208a shall not be construed to relieve such facilities from the obligation to comply with any other provision of this chapter or chapter 446e, including but not limited to, operational requirements and other applicable requirements of regulations adopted under section 22a-209.

Registered leaf waste composting sites are either municipally-owned, privately owned, or on-farm locations. There are approximately 100 registered sites with a total estimated 662,192 cubic yards of leaves processed per year. Details regarding these sites are provided in Table D-7. Note that in some cases a single municipality may have more than one site. The CT DEP regulations also provide for sheet leaf composting which is the application and incorporation of leaves on cropland actively devoted to agricultural production, as a soil amendment and mulch; the CT DEP encouraged municipalities and farms to enter into mutually beneficial arrangements for the delivery of leaf waste. A separate notification process was developed for these farm activities and the CT DEP developed an educational primer on sheet leaf composting. The Manual of Best Management Practices for Agriculture was also amended to include grass clipping utilization guidance for farms. Details regarding these sites are provided in Table D-7.

Table D-7
Summary of Registered Leaf Waste Composting Sites

Site Type	Number of Sites	Total Capacity in Cubic Yards(CY)	Average Capacity (CY) Per Site
Municipal	80	428,552	5,357
Private Non-Farm	14	143,444	10,246
Private Farm	6	90,200	15,033
Total/Average	100	662,196	6,622

(1) Source: CT DEP list of active leaf composting facilities, available at http://www.dep.state.ct.us/wst/compost/listcsites.htm.

As Table D-7 indicates, most of the capacity for leaf waste composting among the registered sites is with the 80 municipal sites, who have about 65 percent of the capacity. The private non-farm sites average a higher capacity per site, and together comprise roughly 22 percent of registered site capacity. The farm sites have the highest average capacity per site, at 15,033 cubic yards per site, and collectively manage roughly 14 percent of the registered sites' capacity.

Home Composting and Grasscycling

The CT DEP promotes the waste reduction activities of home composting and grasscycling through their website and educational videos which were distributed free to towns and libraries, and continues to be aired on local public access television.

They are also for sale in the CT DEP Store. As part of the annual reporting process, municipalities are asked if they promote these activities. A point value (1/2 to 1 full point) is assigned for each "yes" response to questions posed. Points are then summed. Total points translate into different participation rates (10, 15, or 20 percent) for the grasscycling and home composting programs. Estimates of waste reduced are also based on the number of composting bins or the number of mulching mowers or blades distributed or subsidized during the year. Credit is also given for those distributed in previous years, if education is ongoing. Bins distributed more than five years ago are assumed to be in use at the rate of 75 percent. Based on these estimated participation rates, the CT DEP credits municipalities with reducing the amount of organic waste disposed based on the following:

- The average yard yields 1,200 pounds of grass clippings per year; and
- Home composting results in an average source reduction of 646 pounds per household per year.

The CT DEP developed these estimates based on a review of studies and case studies.

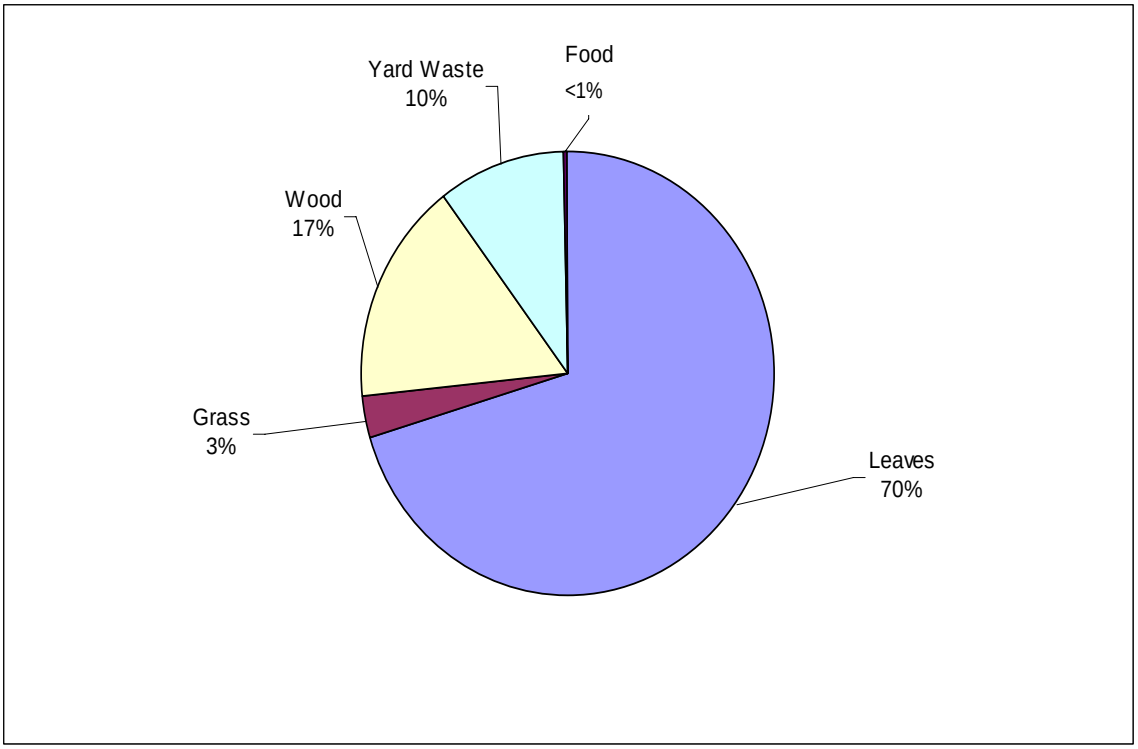
These credits are awarded as a means to provide recognition to those towns actively promoting grasscycling and home composting and are not meant as actual measurements of waste reduction. Most communities that receive waste reduction credits are receiving credit for relatively low tonnages. There are only seven municipalities that received source reduction credits for greater than 2,000 tons in FY 2003. Eighteen municipalities had source reduction credits for greater than 1,000 tons in FY 2003.

A total of 28,025 tons of organics were estimated to be backyard composted, and a total of 21,531 tons of grass clippings were estimated to be left on the lawn based on the methodology described above, for a total of 49,578 tons of yard waste that did not need to be disposed or managed off-site. It is likely that some municipalities fill out their annual reports more thoroughly than others, and that the reported quantities of yard waste recovered and source reduced may therefore be understated. This type of organics management is difficult to measure and classify since the material is generated but not disposed or recycled off-site.

Summary of Yard Waste Diversion

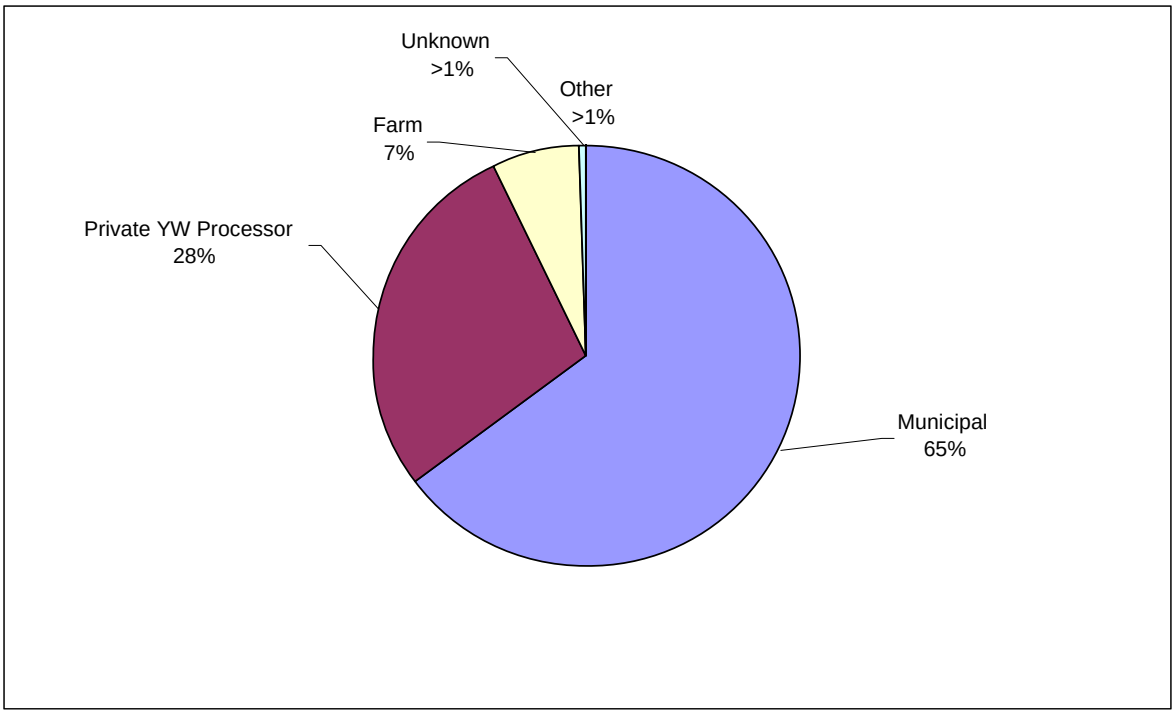
In FY 2003, Connecticut municipalities reported that approximately 223,000 tons of yard waste was generated in their municipality and was recycled or composted. This reported amount does not include yard waste that was home composted, grasscycled, left on site, or illegally disposed off-site. The amount reported translates to 129 pounds per capita per year of yard waste recovered. It is important to remember that the actual amount of yard waste composted or recycled is likely somewhat higher than that which is reported. Figure D-1 shows the percentages of municipally reported organics recycled in FY2003. As shown in Figure D-1, most of the municipally reported organic waste recycled consists of leaves (70 percent), followed by wood waste (17 percent), yard waste (10 percent), grass (3 percent) and food waste (less than one percent). An analysis of how these reported recyclables are processed (e.g., by municipal facilities, private facilities, or farms) is presented in Figure D-2.

Figure D-1
Organics Reported Recycled By CT Municipalities in FY 2003



Data Source: CT DEP

Figure D-2
Types of Recycling Facilities Processing Reported Recovered Organics in FY 2003



As Figure D-2 shows, most (65 percent) of the reported tonnages recovered are processed at municipal sites, 28 percent is processed by private non-farm processors, 7 percent is processed by farm processors, and less than 0.5 percent by unknown (not reported) types of facilities and less than 0.5 percent by other types of processors (e.g. renderers).

Clean wood in MSW includes yard waste/brush and pallets, spools, skids, packaging material, scraps from newly built wood products that are untreated and contain no adhesives, paint, stain, fire retardant, pesticide or preservative. Yard waste/brush is handled by municipalities and permitted recycling facilities; this material is generally chipped and used as mulch or composted. Although some of this material is being re-used, for example pallets in good condition, some of it is finding its way to facilities processing land clearing debris for mulch or compost or to C&D volume reduction facilities which may recover such clean wood for mulch or compost. The remainder is being disposed at waste to energy facilities or landfills. For a discussion on land clearing debris, see Appendix H and Chapter 4 which address special wastes.

Assessment of Municipal Yard Waste Infrastructure

Although the CT DEP does not annually survey the municipalities regarding their existing hauling infrastructure, it appears that most municipalities provide residents with access to yard waste collection (of some sort) and processing. For example, of the 169 municipalities in the State, 115 reported recycling some quantity of yard waste in FY 2003. It is speculated, however, that some municipalities do not fill out their

reports as completely as they could. Thus, the list of municipal registered sites was reviewed, and of the 54 municipalities that did not report yard waste tons recycled in 2003, nine have municipal registered leaf waste composting sites. Another three had indicated that they have an arrangement either with a private processor or farm to accept leaf waste. Thus, it appears that only 42 municipalities may not provide for yard waste processing for residents. It is possible, however, that these residents have access to regional transfer stations that accept yard waste, or have private haulers that collect yard waste through and "open" system, and deliver yard waste to a processing site. It is also possible that some residents in rural areas do not find it necessary to have separate collection of yard waste. It is also possible that registered sites are inactive, and/or arrangements with private processors and farms have fallen through. This seems less likely, however, as it is difficult to take programs away from residents once they are implemented – particularly when they are managing a material that has been banned from disposal.

Farm-Generated Waste

Farm-generated waste and other waste that is integral to the farming operation can be composted on site, providing the waste and the processing meet certain criteria. The CT DEP has a program that addresses this issue. The primary concern of this program is to ensure that stormwater runoff does not carry pollutants into waterways or infiltrate groundwater supplies. The farm must therefore submit an approved Agricultural Waste Management Plan ("AWMP") that shows the precautions taking place to ensure that this is true. There are 25 AWMP's filed with the CT DEP, however only 21 are active. Together, these 21 sites are expected to compost approximately 34,000 cubic yards per year. The types of waste managed include:

- Vegetative waste;
- Poultry, horse, sheep, pig, and cow manure;
- Waste paper;
- Leaves;
- Vegetable slurry;
- Dead chickens;
- Sawdust bedding;
- Fresh hay;
- Slaughterhouse waste (mostly poultry);
- Kitchen waste; and
- Wood shaving bedding.

The CT DEP reviews the Agricultural Waste Management Plan and generally conducts a site visit to the farm to ensure that materials are being managed properly. Because there are relatively few farms in Connecticut, and the number is declining,

this is not likely to become a major means of waste reduction. However it provides a beneficial product for some farms, and helps these farms avoid disposal costs.

Food Waste

Introduction

The CT DEP has been proactive in getting the public aware of commercial, industrial and institutional food residuals composting and has had some successes. Currently, there is no known composting of food waste occurring in Connecticut beyond that which is processed through the Agricultural Waste Management Plan program, a successful composting program undertaken at a State prison, a few pilot projects, and some school composting programs. The CT DEP contracted with a private firm to conduct a food waste mapping study in 2001. At that time, it was estimated that there were over 1,300 potential sources for significant amounts of food waste in the State. These generator types included the following categories, and considered only those that met certain size thresholds:

- Food manufacturers/processors;
- Food wholesalers/distributors;
- Health care facilities;
- Colleges/universities;
- Independent schools;
- Correctional facilities;
- Resorts/conference facilities;
- Supermarkets; and
- Major private employers.

The study indicated that between 99,946 and 153,331 tons of source-separated organics could be collected from these generators as feedstock for composting. The study further concluded that there are enough generators of organics in Connecticut to warrant pursuing an organics composting program including food waste. Restaurants were not analyzed for organic waste generation for a variety of reasons including the sheer number of them and because they frequently go in and out of business. The study did, however, map restaurants in the Hartford County to demonstrate the capabilities of the database and GIS mapping combination for such things as developing collection and hauling routes.

Industrial

An industrial food plant owned by Nestle also owned and operated a composting facility in New Milford, called New Milford Farms. This facility, which was permitted to receive up to 54,000 tons per year, processed industrial food residuals from the local plant (which manufactures bullions and other flavorings) as well as food residuals from Nestle plants in New York and New Jersey. Feedstocks included

tea leaves and coffee grounds. The facility also accepted yard waste, clean wood waste, and pallets for processing, for a tip fee. In addition they processed washwater sludge from a food processing facility located across the street, and vegetative waste from two Stop and Shop stores (one located in Danbury, the other in New Milford), and hydrolyzed plant protein that was mined from the company's on-site landfill dedicated to this material. The processing was all under cover, using windrow technology. Composted cow manure was also delivered to the facility, and topsoil, potting soil, and manure blends were developed to a third-party marketing company's specifications. New Milford Farms, in its best year, produced 944,000 40-pound bags (19,880 tons) of product. The facility has ceased operating.

Institutional

The CT DEP also funded the publication of a manual to instruct schools (K-12) how to develop an on-site food residuals composting program. This manual was based on the experience of Mansfield Middle School, which developed a pilot composting program in 2000. The school of 650 was able to compost 4,168 pounds of food scraps, along with three to four cubic yards of leaf waste and wood chips, to produce 1.5 cubic yards of compost in their first year. During the second year they were averaging 37 to 49 pounds per day of food waste (including both kitchen scraps and plate scrapings). The CT DEP does not monitor the number of such programs in existence, or the volume of food waste being source reduced in this manner, although they have the sense through media attention that such programs are growing.

Commercial

It is reported that food waste from the Mohegan Sun Casino in Uncasville, Connecticut is being diverted to the Millaras Piggery in Waterford, Connecticut. In FY 2002, it was reported that 2,482 tons of food waste was diverted from the casino to this farm.

Stakeholder Roles in Organics Recycling

Stakeholder roles in promoting and implementing organics waste reduction and recycling programs are summarized in below.

Haulers

Many municipalities and private haulers provide separate yard waste collection. See Table D-6 for examples.

Facilities

Private facilities offer yard waste and clean wood processing and composting. See Table D-7.

Municipalities

Municipalities must mandate recycling of leaves and grass (leaving grass clippings on the lawn is the preferred method for dealing with this material). Many municipalities provide yard waste processing and/or drop-off sites for these materials and many also provide education on yard waste management and offer home composting bins and information on grasscycling.

Generators

Many citizens participate in grasscycling and backyard composting, supported by municipalities and regional authorities that offer compost bins, technical assistance, and educational materials. Connecticut's Enfield prison is conducting food waste composting programs. Mansfield Middle School and Foodshare have a vermicompost program. Stonington/Groton has a commercial organics collection program.

Authorities

GGS Section 22a-208v requires the CT DEP and CRRA to provide for a program of public information to promote the recycling of grass clippings by composting at the property where the grass clippings are generated, by allowing the grass clippings to decompose in place or by composting grass clippings at a municipal or commercial composting facility. The SCRRRA Education Center at the Groton IPC includes a demonstration composting garden and has sold compost bins through State grants (when available) or at cost. Some authorities provide yard waste collection.

CT DEP

The CT DEP made leaves a mandatory recyclable and banned grass clippings from landfills. Eased regulations for leaf waste composting and clean wood processing facilities. The CT DEP works with farms to develop AWMP's. The CT DEP has had a food mapping study done in 2001. The CT DEP also provides information on leaf composting, grasscycling, composting for schools, and conducted research on using compost for erosion control.

The CT DEP offered grants to municipalities to fund yard waste processing sites in the early 1990's. Some of this money was used for backyard composting programs.

Summary of Current Waste Diversion Practices

Non-Organic Materials

The infrastructure for aggregating, processing and marketing most recyclable materials is in place. Because markets for most recyclable materials are strong and are expected to remain strong for some time, it is expected that private and/or public entities will increase capacity as the need for additional capacity develops.

- Most aggregation facilities (e.g., transfer stations) are publicly owned.

- Much of the recyclables processing infrastructure is privately owned.
- Most residents have access to recycling, although recycling could be made more convenient for some sectors, such as those living in more rural areas and those living in multi-family dwellings.
- Regional organizations are managing electronics recycling collection programs and household hazardous waste disposal for many municipalities. They have taken on this role, but many lack funding to provide comprehensive regional services, including education, about these specialized collection and recycling needs.
- The extent to which commercial entities recycle is unknown, however stakeholders indicate that commercial recycling, especially for small businesses, could increase considerably.
- Larger businesses appear to recycle due to cost savings as a result of economies of scale and mandate.
- The eleven State mandated recyclables are required to be recycled statewide. However, depending on markets used, the designated recyclables may be collected as part of a recycling mix for example corrugated cardboard may be collected as part of a paper mix instead of as a separate grade – but it is still collected and marketed. In addition, towns have added recyclables (in addition to the State mandated items) for which they have identified markets.
- It is unknown how much material is being recovered through the State's bottle bill program, and reporting of these quantities is not required.
- Currently, some collection programs and IPCs accept additional materials, but residential mixed paper is under-recovered in some parts of the State and food waste is not collected.
- Enforcement of recycling mandates is minimal.
- In Connecticut and as found in other states, source reduction estimates are not being made because the measurement of this activity is very difficult to quantify or model. However, the CT DEP has made some attempt to quantify waste managed on site such as grasscycling and home composting.
- Commercial and residential sectors often have no incentive to reduce the amount of solid waste they dispose.
- Small commercial waste generators, in particular, lack incentive to recycle materials, as they may not be able to reduce the frequency of pick ups (and thus costs) by recycling.
- Fee structures paid at the various recycling facilities in the State are inconsistent. At CRRA facilities, for example, there is no tipping fee charged for recyclables delivered to the IPC. In other regions, however, recycling tip fees are about half of the tip fees for disposed MSW.
- The types, frequency, and quality of recycling/waste reduction education and outreach are not consistent throughout the State. With few exceptions, the State

does not participate in, or offer to municipalities, any of the new, contemporary recycling motivational campaigns developed by other states and private organizations, that are free or have very low costs However, there are costs associated with implementation and State funding for these outreach campaigns are not available.

- Funding for municipal and regional recycling coordinators and infrastructure development is no longer available from the State, hence some programs lack staff, promotion and educations, and enforcement.
- Lack of waste characterization data makes it difficult to identify capture effectiveness and recycling and waste reduction opportunities and priorities.

Organic Materials

- The infrastructure for collecting yard waste is largely in place throughout the State.
- There may be an opportunity to increase the amount of brushy waste being recovered, as it is not currently banned from disposal and many communities do not offer separate collection of brush and tree limbs mandated as a material that can not be disposed.
- Some brushy waste that is delivered to transfer stations is reportedly burned, not ground into mulch (although reported tons are supposed to be recycled, not burned, this stream still represents a separated material that is not recycled).
- The CT DEP does not count wood used as fuel as recycled.
- The amount of yard waste recovered, particularly recovered by private entities, is likely under reported.
- Much of the leaf compost and mulch produced at municipal sites is given away free of charge.
- There are many private entities that have entered the market to process and market organic products.
- There is no significant amount of food waste being composted in Connecticut at this time, although there are several food waste composting “pilot projects” operating at schools, at Food Share, in some towns, and at a prison.
- There are no permitted composting facilities that accept food waste operating at this time.
- There is no infrastructure in place in Connecticut to process food waste.
- Source separated organics recycling facilities taking materials from off-site sources at a rate greater than one ton per hour are required to obtain an individual solid waste volume reduction plant permit.

Appendix E
OPTIONS TO INCREASE WASTE DIVERSION

This appendix presents four brief, revised handouts that were used during a meeting of the External Stakeholder Committee to help frame a discussion of alternative waste diversion options. The meeting was held in August 2005 as part of the efforts leading to preparation of this Plan. Waste diversion is used here to refer to diversion of solid waste from disposal, through source reduction, reuse, recycling and/or composting.

The revised handouts include the following:

- **Opportunities to Increase Waste Diversion** identifies the five broad opportunities that lead to increased waste diversion: reducing the amount of waste generated; increasing access to recycling and reuse services; increasing the range of materials covered; increasing participation and capture rates; and increasing processing efficiencies. Also provided are illustrative examples of the many types of policies and programs that can be employed to successfully seize these opportunities. This handout is intended to identify the five main results that all types of efforts to increase waste diversion must seek to effect, in one way or another.
- **Menu of State Options to Overcome Barriers and Pursue Opportunities** is a listing of options that State agencies can employ to achieve increased waste diversion through the opportunities described above. The options are grouped into ten categories: State funding mechanisms; financial assistance; technical assistance; research; mandates; education and outreach; regulatory reform; incentives; regional efforts; and facilitation and partnership building. This handout is intended to provide a list of options for consideration.
- **Current Conditions in Connecticut and Examples of Alternative Approaches** is a table that identifies eight elements that together characterize a state's waste diversion approach: the diversion rate and trends; goals and measurement; planning and measurement; State program funding; State policies to drive local waste diversion efforts; local infrastructure and services; State programs to assist and promote waste diversion; and drivers of manufacturer activities to support waste diversion. For each of these elements, the table provides a very brief synopsis of current conditions and practices found in Connecticut, and provides observations about some examples of approaches and conditions in select, other states. This handout is intended to broadly characterize Connecticut's current waste diversion programs and provide context in terms of some other states' efforts.
- **Elements of Highly Effective Local Waste Diversion Programs** lists twelve categories of policies, programs and activities that together characterize highly effective local waste diversion programs: goals, planning and staffing; funding and financial incentives; education and outreach; technical assistance; source reduction; residential services; commercial services; facilities; public venue

services; community partners; market development; and special waste programs. Examples are provided under each category. This handout is intended to indicate the broad range of local and regional activities that states should seek to promote and support.

Opportunities to Increase Waste Diversion

There are five primary opportunities to increase waste diversion in Connecticut:

1 Reduce the amount of waste generated, for example by:

- Expanding efforts to promote grass cycling and on-site composting;
- Promoting new product and packaging designs that reduce waste;
- Providing hands-on technical assistance to businesses;
- Promoting changes in consumption patterns; and
- Expanding producer responsibility for the waste generated by their products.

2 Increase access to and use of recycling and reuse services, for example by:

- Establishing new multi-family, away-from-home and commercial recycling services where they do not currently exist. Where they do exist, make these services more efficient, less costly, and more convenient to assure that these sectors use those services and participate in recycling programs.
- Encouraging haulers to offer enhanced recycling services to residents and commercial businesses in an efficient and cost effective manner;
- Promoting new reuse business opportunities for charities and local governments such as those in Berkeley (CA) and Monterey (CA); and
- Promoting new manufacturer-funded or operated recycling services.

3 Increase the range of materials recovered in recycling programs, for example by:

- Adding additional materials to existing curbside and drop-off programs;
- Expanding the range of containers included in the bottle bill;
- Expanding food waste composting services;
- Supporting stronger markets for waste materials with currently low demand and/or price; and
- Promoting the design and/or use of products that are more readily recyclable (e.g., waxed cardboard substitutes).

4 Increase participation and capture rates in existing programs, for example by:

- Funding major Statewide and local public outreach campaigns;
- Assuring that local recycling information such as local participation instructions and requirements is readily accessible and available to everyone in Connecticut;

- Exploring the costs and benefits of implementing single stream collection systems combined with enhanced processing systems and, based on findings, decide whether to promote single stream recycling collection in CT. The potential costs would include the cost of retrofitting the collection infrastructure and State's IPCs, as well as the risks attending the marketing of contaminated paper. The potential benefits include simpler preparation of recyclables by resident and lower collection costs;
- Exploring the option of increasing the size of curbside recycling containers to promote greater participation;
- Establishing price incentives through the promotion of pay-as-you-throw systems, raising the cost of disposal, and/or through innovative contracting practices with haulers, recyclers and processors;
- Establishing additional mandatory recycling items and/or disposal bans; and
- Increasing recycling enforcement efforts on the local, regional, and State levels.

5 Increase processing efficiencies to decrease residuals and improve the quality of materials marketed, for example by:

- Providing technical and financial assistance to modernize existing processing facilities; and
- Promoting regional cooperation to improve economies-of-scale.

Menu of State Options to Overcome Barriers and Pursue Opportunities

Category	Options
State Funding Mechanisms	■ Extend the solid waste assessment at RRF's (CGS Section 22a-232) to cover all discarded waste, whether at RRF facilities, landfills or export. This would become an obligation of the cities and towns. ■ Increase amount of RRF fee. This would become an obligation of the cities and towns. ■ Product or packaging fees assessed either at retailer or manufacturer level. ■ Adjust beverage container deposit system to retain escheat payments (expand system to increase potential revenue amount). ■ Evaluate other existing Connecticut programs for revenue sources.

Category	Options
Financial Assistance	■ Grants to municipalities, regional authorities, private businesses for ■ recycling equipment, operations and/or coordinators; ■ projects to promote reuse; ■ source reduction, reuse, recycling education; ■ other program enhancements. ■ Active recycling business development financing programs, including loans, loan guarantees through the CT Department of Economic and Community Development in consultation with the CT DEP, CRRA, etc. ■ Shared development, ownership and/or operational stake in processing facilities.
Technical Assistance	■ Provide expert staff, funding and/or contractors to: ■ promote local program optimization; ■ help analyze local options; ■ assist private recycling and reuse businesses; ■ conduct waste audits and analyze benefits of waste diversion; ■ promote contractual and ownership alternatives to flow control. ■ Establish and promote best practices for local programs and markets.
Research	■ Conduct waste characterization studies to assist local governments and businesses in identifying waste diversion opportunities and strategies. ■ Sponsor research by Connecticut universities and others to innovate new, more efficient waste collection, processing and product manufacturing approaches. ■ Document developments in waste management and market development technologies that may benefit Connecticut.

Category	Options
Mandates	■ Target waste generators and service providers by ■ expansion of landfill bans; ■ expanding the list of mandated recyclables; ■ strengthening enforcement of recycling mandates. ■ Target local jurisdictions by ■ requiring waste diversion planning and/or goal achievement; ■ requiring levels of recycling service; ■ requiring recycling coordinators. ■ Target product manufacturers by ■ promoting voluntary product stewardship initiatives; ■ adopting producer responsibility legislation; ■ adopting minimum content or utilization requirements. ■ Target State agencies by ■ enhancing recycled product procurement practices; ■ requiring waste diversion plans and/or goal achievement.
Education and Outreach	■ Prepare promotional materials for local use. ■ Conduct Statewide campaigns, including publicity and ads at the State and local level. ■ Leverage existing materials developed by other states and trade associations. ■ Enhance information services such as web site, hotline, brochures, etc. ■ Conduct ongoing workshops and training seminars for ■ municipal recycling staff; ■ commercial businesses (to reduce waste costs); ■ promotion of market development initiatives. ■ Provide information on recycling markets and opportunities. ■ Document the economic and environmental benefits of recycling and reuse.
Regulatory Reform	■ Streamline facility permitting processes, where appropriate.

Category	Options
Incentives	■ Promote or require local pay-as-you-throw pricing systems. ■ Tie financial assistance to performance targets. ■ Increase beverage container deposit amounts. ■ Promote service and facility ownership agreements that include built in financial incentives for maximizing waste diversion.
Regional Efforts	■ Establish goals by region. ■ Fund regional facilities.
Facilitation and Partnership Building	■ Work with other states and US EPA to promote product stewardship initiatives. ■ Forge alliances between recycling, business development, transportation, purchasing and other state agencies to build markets and promote recycling. ■ Work with other states and industry on national and statewide education and promotion campaigns. ■ Maintain and strengthen alliances with other Northeastern states in NERC and NEWMOA. ■ Fund research and policy centers at Connecticut universities.

Current Conditions in Connecticut and Examples of Alternative Approaches

Element	CT Current Practices	Observations and Examples from Other States
Diversion Rate Trends	Municipally reported disposal diversion has remained stagnant for past several years at about 24%.	Similar to situation in many other states. Diversion has declined in some states (e.g., NJ from 45% in 1995 to 32% in 2003), and is increasing in only a few (e.g., CA, from 25% in 1995 to 48% in 2003; MA from 51% in 1999 to 57% in 2001.) PA currently at 26% with goal of 35% by 2005.
Goals and Measurement	25% recycling and 15% source reduction. Tracking of municipal waste diversion efforts. Little documentation on commercial recycling, beverage container deposit redemptions and source reduction. No Statewide waste characterization data to determine prevalence of recyclables in disposed waste stream.	Similar to many other states. Source reduction and non-municipal diversion are always difficult to measure. State diversion goals of up to 70% (MA), with a wide range of measurement practices. CA: waste diversion formula with proposal to move to disposal accounting only plus best practices. NJ and many states: Documented municipal flows plus commercial estimates. Many states: similar to EPA standard methodology, includes broader range of materials in MSW than CT. OR: 2000 50% goal extended to 2009, regional goals of 10%-65%, combine to State goal. City goals of 70%+ in many CA local governments (e.g., SF, Alameda, Palo Alto). MN: Best practices approach to measuring source reduction. Alternative measures under consideration (PA, CA). Several states (e.g., PA, GA , OR, WA, CA) have performed statewide waste characterization studies and/or require local studies.
Planning and Measurement	Last adopted Statewide plan in 1991. Focus on guaranteeing sufficient disposal capacity. Plan proposed in 1999 but not adopted.	Common for states to prepare plans on 5-10 year basis. Two- year development process not uncommon. Some recent plans: NJ (05), OR (05), CA (03), WA (05). Some state plans have broad focus on sustainability, materials management and/or zero waste (MN, WA, CA).

Element	CT Current Practices	Observations and Examples from Other States
State Program Funding	Fee levied on waste disposed at RRFs. Fee not levied on exported wastes or wastes disposed in CT landfills.	Many states have disposal fee funding mechanism. Other funding systems include: ▪ State retains unredeemed bottle bill deposits (CA, MA); ▪ Product fees for targeted programs (many states tires, CA electronics, oil, VA packaging, FL Sunset packaging ADF); ▪ Business recycling tax (NJ sunset); ▪ Bond issue (NY).
State Policies to Drive Local Waste Diversion Efforts	State goal of 25% recycling + 15% source reduction and/or additional recycling. Local authority must identify a recycling contact, only some towns have coordinators. Mandatory recycling for designated materials (glass and metal food containers, scrap metal, high grade white office paper (non-residential), Old Corrugated Cardboard (OCC), Old newspaper (ONP), waste oil, leaves, lead acid storage batteries, Ni-Cad rechargeable batteries, grass. Grass, and lead acid storage battery disposal bans. Local recycling ordinance required. Haulers must notify municipality of non-compliance and issue warnings. RRF operators must notify driver/municipality of significant recyclable loads. Fines of up to $1,000. Hauler fines for knowingly mixing recyclables with waste.	Some states have mandates on local governments. CA: 50% diversion with 5-year plans and annual updates, up to $10,000/day fine for noncompliance. PA: Programs required and must include designated materials. Some states have mandates on generators like CT (e.g., NJ, NY). Enforcement of recycling mandates is always problematic and generally not aggressively pursued. Some states use bans extensively as a driver (MA, WI). Some states require PAYT (IO, MN, WI) and some have provided incentives for PAYT or other local innovations via grant programs (MA, PA). Over 6,000 PAYT programs nationwide.

Element	CT Current Practices	Observations and Examples from Other States
Local Infrastructure and Services	Nine recycling regions originally established (many no longer active), some handle recyclables contracting and/or marketing. Regional disposal system via RRFs. CRRA established in 1973. Regional Intermediate Processing Centers (IPCs) established, complemented by commercial processing facilities. Many towns include materials beyond the designated list. Many municipalities contract for residential waste and recyclables collection. Most IPC contracts are at regional level. Two regions have no IPC tip fee for residential bottles, can, and paper, others have IPC tip fees much lower than disposal tip fees at the RRFs; one has revenue sharing. Some PAYT programs. Some public education and promotion. Beverage container deposit and battery deposit collection systems handled separately. Most commercial recycling handled independently of municipalities.	CT offers more comprehensive access than many states, and regional IPCs provide a strong foundation and offer favorable pricing. Significant, sustained growth in diversion infrastructure continues in relatively few states/cities: ▪ CA (driven by local mandate and public support, some cities at over 60% or even 70%); ▪ Cities driven by strong public support (Portland) and/or local capacity challenges (Seattle). As in many states, local infrastructure growth has slowed or stalled. Main opportunities for growth are typical, including: ▪ expanding range of materials typically accepted (e.g., mixed paper, food waste, clean wood); ▪ increasing multi-family and small-business access; ▪ need for more aggressive and sustained education and promotion; ▪ potential for incentive-based contracting and facility ownership/pricing structures; ▪ need for significant new local and state funding to drive efforts; ▪ potential for private sector recycling enterprise expansion; ▪ facilities to further sort residual streams for recyclables.

Element	CT Current Practices	Observations and Examples from Other States
State Programs to Assist and Promote Waste Diversion	Integrated Waste Management Hierarchy formally adopted. State permitting responsibility for solid waste facilities. State procurement price preference policy. Required State agency plans to eliminate the use of disposables/ single use products by State government.	Many states formally adopted IWM hierarchy. States have developed a wide range of promotion and assistance programs: ▪ State staff/specialists (many states); ▪ Business waste reduction assistance (CA, MA, ME, WI); ▪ Regional State recycling staff (PA, MA, NY). State grants to local governments: ▪ CA (HHW, electronics, reuse, beverage containers, market development) ▪ PA (per tons, equipment, expansion); ▪ WI (local program operations); ▪ Business market development/business development (NC, CA, AZ, IO, MA); ▪ Procurement (many states).
Manufacturer Drivers	Lead acid battery deposit law; Beverage container deposit law; Newsprint and directory minimum content purchasing law; Directory publisher requirement to recover a percentage of directories distributed in CT; Toxics in packaging law. Participation in Northeast Recycling Council, Northeast Waste Management Officials Association and Product Stewardship Institute.	Few states have adopted very many manufacturer related legislation, CT has more than most. Some states are adopting policies explicitly promoting product stewardship or producer responsibility (MN, CA). Some states are funding product stewardship initiatives (MN, CA, NC).

Elements of Highly Effective Local Waste Diversion Programs

Goals, Planning and Staffing

- Sufficient funding.
- Recycling or waste diversion goals/targets drive progress.
- Regularly updated plan to achieve waste diversion goals and increase system efficiency.
- Typically, at least one full-time dedicated recycling staff person per 500,000 to 1,000,000 population to maintain programs.
- Ongoing task force or advisory committee, and engaged elected officials.
- City as a model: aggressive programs for city buildings and operations.

Enforcement

- Consistent enforcement of recycling laws and regulations

Funding and Financial Incentives

- Funding for all diversion activities derived from rate structure, not from general fund or property tax assessment.
- Critical importance of municipalities to understand the full cost of solid waste management and be cost-efficient in providing collection services.
- Incentives for increasing diversion offered via:
  - Recycling costs low relative to disposal;
  - PAYT pricing;
  - Hauler contracts and facility/service rate structures;
  - Ownership and operation of facilities and rates.

Education and Outreach

- Sustained program of education and outreach via local media, mailings and other avenues, including community based social marketing.
- School-based education programs in place.
- Simple, easy to understand, widely disseminated (on an ongoing basis) instructions for recycling participation, especially for new residents and

businesses and new town government officials including Board of Education members.

- Awards and recognition for local leaders.

Technical Assistance

- Hands-on assistance to commercial businesses (e.g., waste audits, service contracting, etc.)
- Market and service provider information readily available.
- Workshops and case studies widely available and disseminated.

Source Reduction

- Focus on on-site organics management in all programs:
  - Home composting, grass cycling;
  - Food waste recycling at commercial establishments;
  - Education and technical assistance;
  - Purchase or subsidize and distribute bins, mulching blades, etc;
  - Workshops and training.
- Focus on purchasing and operational changes in commercial businesses:
  - Paper reduction;
  - Reusable packaging/shipment options;
  - Address in educational and technical assistance programs.
- Provide price incentives:
  - PAYT pricing;
  - Waste hauler/collector contractual structures.

Residential Services

- Broad coverage of curbside services:
  - Wide range of materials (especially mixed paper and yard waste) and viable, continuing markets for those materials;
  - Yard waste services provided (some include food waste);
  - Large bins, regular service, easy to use, clear education materials.
- Drop-Off programs complement curbside:
  - Main option for rural, remote or low-density areas;
  - Complement curbside with added convenience and/or wider range of accepted materials.

Commercial Services

- Competition driven services and pricing:
  - Open market based commercial recycling services;
  - Franchise contracting for commercial garbage services.
  - Wide range of materials and services offered, including food waste.
  - Aggressive education/outreach and technical assistance services
  - Case studies;
  - Hands-on audits and assistance contractors/staff/nonprofits;
  - Typical targets: office buildings, restaurants, retail.
- At-work recycling services promotion.

Facilities

- Ample capacity at regional processing centers for recyclables and organics.
- Additional sorting of residual streams to remove recyclables.

Public Venue Services

- Recycling drop-offs (conveniently located to minimize extra driving) in down town areas, city buildings, etc.
- Recycling at special events.

Community Partners

- Community based non-profits to assist in education, promote reuse and other enterprises, etc.
- Partnerships with State, US EPA, industry on select projects.

Reuse/Recycling Enterprise and Market Development

- Environmentally preferable (including recycled content product) procurement program for all purchases.
  - Include roads projects (aggregate, tires, etc.).
  - Close coordination with business development/promotion programs
  - Business siting and expansion assistance;
  - Certified green business program.

Related Special Waste Programs

- Permanent HHW facility.
- C&D ordinance promoting and providing incentives for recovery and reuse.
- Green building program.
- Market development and product stewardship policies and programs.

Appendix F
SOLID WASTE DISPOSAL OVERVIEW

Introduction

This Appendix provides an overview of Connecticut's historic disposal practices for municipal solid waste ("MSW"), RRF ash residue, and bulky waste. This historic data is the basis for the assumptions regarding MSW disposal for the next 20 years on which the Solid Waste Management Plan is based. These assumptions are presented in Appendix B.

The first section of this appendix is a review of selected Connecticut legislation regarding disposal practices. The next three sections describe the disposal trends of MSW, RRF ash residue, and bulky waste.

Connecticut Solid Waste Disposal Legislation

The Solid Waste Management and Solid Waste Management Services Acts, Chapters 446d and 446e respectively of Title 22a of the Connecticut General Statues ("CGS") provide the basis for State-level responsibility for provision of solid waste disposal services for all of the people of the State of Connecticut through development and implementation of a State-wide solid waste management plan. Specifically, CGS Section 22a-259 includes the following as State policies:

- That maximum resources recovery from solid waste and maximum recycling and reuse of such resources in order to protect, preserve and enhance the environment of the State shall be considered environmental goals of the State;
- That appropriate governmental structure, processes and support are to be provided so that effective State systems and facilities for solid waste management and large-scale resources recovery may be developed, financed, planned, designed, constructed and operated for the benefit of the people and municipalities of the State;
- That solid waste disposal services shall be provided for municipal and regional authorities and private persons in the State, at reasonable cost, by State systems and facilities where such services are considered necessary and desirable in accordance with the State-wide solid waste management plan and that any revenues received from the payment of the costs of such services otherwise from the operation of State systems and facilities shall be redistributed to the users of such services provided that the authority has determined that all contractual obligations related to such systems and facilities have been met and that such revenues are surplus and not needed to provide necessary support for such systems and facilities;

- That provision shall be made for planning, research and development, and appropriate innovation in the design, management and operation of the State's systems and facilities for solid waste management, in order to permit continuing improvement and provide adequate incentives and processes for lowering operating and other costs.

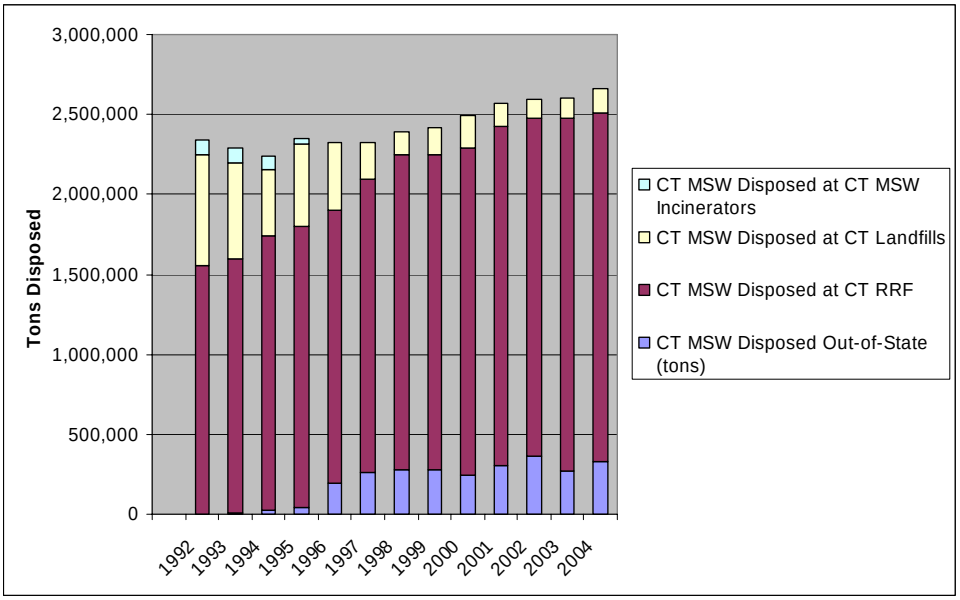
Additional guidance in development of the disposal section of the State solid waste management plan is found in CGS 22a-228(b) which states that the plan shall establish specific goals for source reduction, bulky waste recycling and composting. The plan shall establish the following order of priority for managing solid waste: Source reduction; recycling; composting of yard waste or vegetable matter; bulky waste recycling; resource recovery or waste-to-energy plants; incineration and landfilling.

MSW Disposal

The amount of MSW requiring disposal is equal to total statewide generation of MSW less the quantity diverted through source reduction, recycling and composting. As shown in Figure F-1, the quantity of Connecticut-generated MSW requiring disposal has been growing steadily since 1992. Disposal is growing because waste generation is growing and the amount of material recycled has not grown enough to completely offset that increased growth in MSW generation. MSW generation has been driven by increased per capita generation of waste and population growth.

Reported tons of Connecticut MSW generated has increased about 16 percent from FY1992 through FY2003 (increased from an estimated 2.8 million tons/year in FY1992 to an estimated 3.7 million tons/year in FY2003). The amount of Connecticut MSW disposed has increased from an estimated 2.0 million tons/year in FY1992 to an estimated 2.6 million tons/year in FY2003. MSW disposal tonnages have not risen as quickly as MSW generation rates due to rising amounts of MSW recycled. However, the percent of MSW recycled in Connecticut has remained essentially constant for more than ten years, resulting in increased amounts of Connecticut generated MSW requiring disposal.

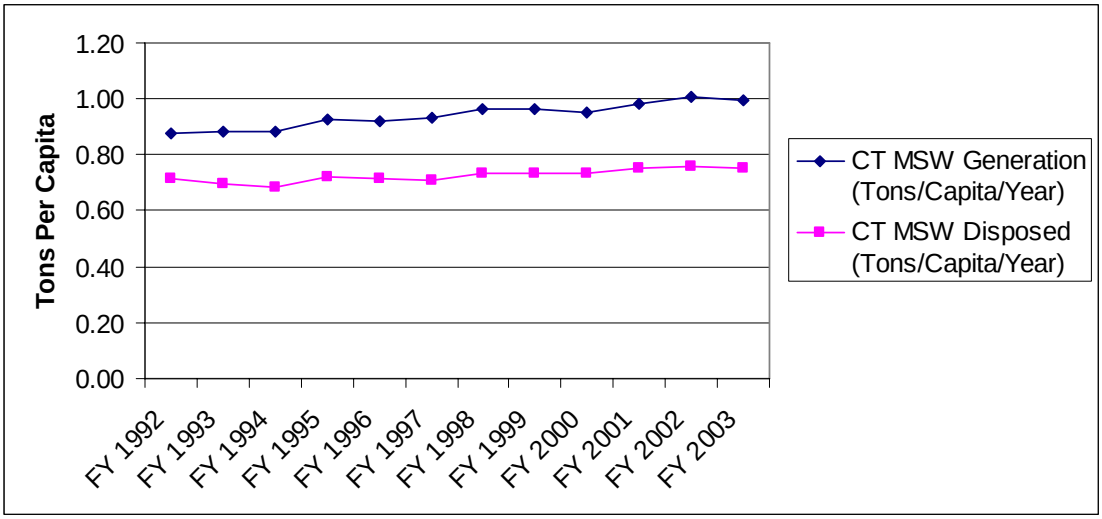
Figure F-1
Disposal of Connecticut-Generated MSW
FY 1992-FY 2004



Source: FY 92-04 data.doc, from CT DEP

As shown in Figure F-2, the per-capita rate of Connecticut MSW generated and Connecticut MSW disposed appear to be increasing, as well. Based on the CT DEP data, per-capita MSW disposal increased from 0.71 tons per capita per year in 1992 to 0.75 tons per capita per year in 2003. While incomplete reporting, especially prior to the year 2002, precludes absolute confirmation of this trend, data from nearby states would suggest that this increase has occurred. Massachusetts and Maine reported three and nine percent increases in generation from 2001 to 2002, respectively.

Figure F-2
Connecticut MSW Per-Capita Generation and Disposal Rates
FY 1992 – FY 2003



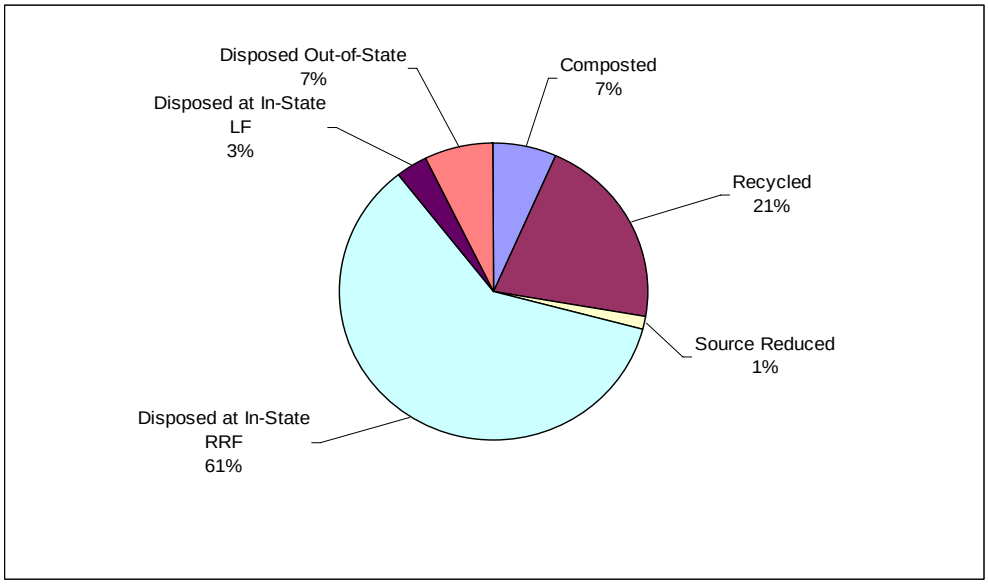
MSW Disposal Practices

As shown in Figure F-3, in 2003 approximately 3.7 million tons of MSW were generated in Connecticut. Source reduction, composting, and recycling amounted to approximately 29 percent (1.1 million tons) of the MSW managed. Approximately 61 percent (2.2 million tons) of the MSW was disposed in in-state Resources Recovery Facilities (RRFs), three percent (103,000 tons) was disposed in in-state landfills, and the remaining seven percent (240,000 tons) was disposed out-of-State.

Figure F-4 shows, by percent, the Connecticut-generated MSW that was not diverted but was disposed in 2003. A total of 2.6 million tons of Connecticut generated MSW was disposed at the following types of MSW disposal facilities:

- About 2.2 million tons (85 percent of all disposed tons), were sent to six MSW Resources Recovery Facilities (RRFs) in Connecticut;
- About 121,000 tons (five percent of all disposed tons) were sent to two MSW landfills in Connecticut; and
- About 269,000 tons (ten percent of all disposed tons) were sent to MSW landfills and waste-to energy ("WTE") facilities outside of the State.

Figure F-3
Municipal Solid Waste Management in 2003
(Total Generation = 3.7 million tons per year)



Additionally, an average of 551,000 tons of RRF ash residue is generated as a by-product of the RRF process from 2000 through 2004, of which about 467,000 tons (85 percent of all ash residue) was disposed at two Connecticut landfills, and about 47,000 tons (nine percent of all ash residue) was disposed in a landfill in New York State. About 37,000 tons (six percent) of scrap metal were separated out of the ash and recycled at the in-state RRFs.

Figure F-4
FY 2003 Disposed MSW

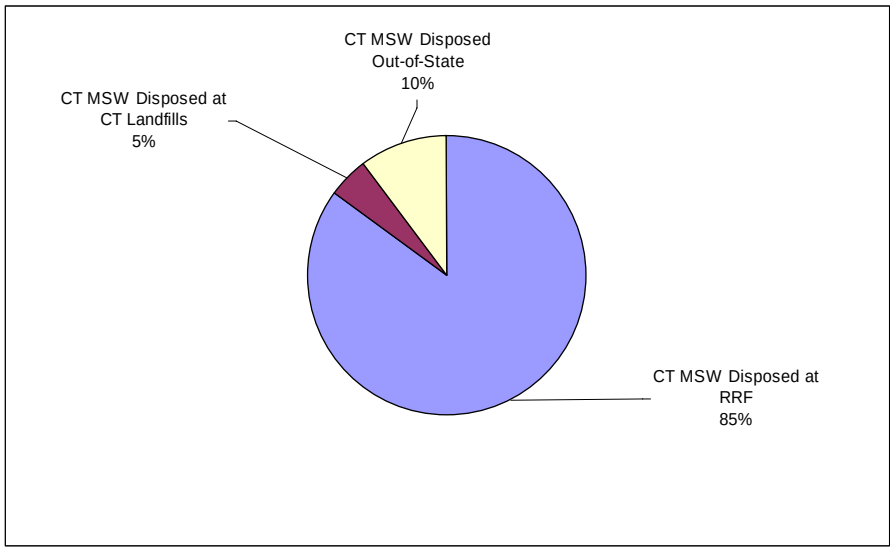


Table F-1 indicates the historical trends in MSW generation and disposal practices in Connecticut. It highlights that the use of landfills and incinerators has been declining steadily, while RRF capacity has grown, due to several expansions and RRF throughput has been stable at a high percent of total capacity.

Table F-1
Connecticut MSW Generation, Recycling, and Disposal (1992 – 2004)

	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
CT MSW Generation – Total	2,883,521	2,897,128	2,900,747	3,041,185	3,006,218	3,046,460	3,157,339	3,167,644	3,232,541	3,351,828	3,464,723	3,430,707	NA
CT MSW Recycled (1)	540,402	605,009	660,378	688,458	679,165	720,483	765,474	749,780	741,076	779,764	867,333	830,264	NA
CT MSW Disposed – Total	2,343,119	2,292,119	2240,369	2,352,727	2,327,053	2,325,977	2,391,865	2,417,864	2,491,465	2,572,064	2,597,390	2,600,443	2,663,529
CT MSW Disposed at RRF	1,553,013	1,587,634	1,716,681	1,757,011	1,712,438	1,830,465	1,972,656	1,966,956	2,047,224	2,118,702	2,111,601	2,210,540	2,184,159
CT MSW Disposed at CT Landfills	694,970	603,773	410,334	517,077	424,034	234,030	143,244	168,994	197,380	149,023	119,786	121,080	152,518
CT MSW Disposed at MSW Incinerators	95,136	92,504	86,322	39,831	---	---	---	---	---	---	---	---	---
CT MSW Disposal Out of State	0	8,208	27,032	38,808	190,581	261,482	275,965	281,914	246,861	304,339	366,003	268,823	326,852
CT Population – US Census Bureau (2)	3,279,000	3,278,000	3,275,000	3,275,000	3,267,000	3,269,000	3,273,000	3,282,000	3,406,000	3,412,263	3,432,463	3,458,362	3,485,881
CT MSW Generation (tons/capita/year) (3)	0.88	0.88	0.89	0.93	0.92	0.93	0.96	0.97	0.95	0.98	1.01	0.99	NA
CT MSW Disposed (tons/capita/year) (4)	0.71	0.70	0.68	0.72	0.71	0.71	0.73	0.74	0.73	0.75	0.76	0.75	0.76

(1) Recycling figures in this table include recycled and composted tons as estimated by the CT DEP. This Plan includes additional estimates for commercial and bottle bill recycling that were not captured in previous waste diversion estimates.

(2) FY Population is U.S. Census population estimate for July 1 of previous calendar year. FY 2002, 2003, and 2004 data source: U.S. Census 2005 Population Estimates, Total Population, April 1 2000 Estimates Base.

(3) Total generation divided by population.

(4) Total disposal divided by population.

Source: CT DEP

The following sections describe each MSW management practice in greater detail.

MSW Resources Recovery Facilities (RRF)

As shown in Table F-2, at the present time, there are six RRFs in Connecticut that process MSW with a combined maximum permitted design capacity of 2.6 million TPY. The six MSW RRFs are: (1) the CRRA Bridgeport Project; (2) the CRRA Wallingford Project; (3) the CRRA Mid-Connecticut Project; (4) the CRRA Southeast Project, Preston; (5) the Bristol Resource Recovery Facility; and (6) Lisbon. There is also an RRF in Sterling, CT, that processes only waste tires. Assuming an on-line efficiency of ninety percent, the six MSW RRFs have an estimated annual MSW disposal capability of 2.3 million TPY. RRFs provide MSW disposal for approximately 140 out of the 169 municipalities in the State. The disposal capacity for all but one facility is substantially utilized under long-term contractual waste delivery commitments. All six facilities have at least 20 years of remaining useful life assuming normal maintenance and ongoing upgrading of environmental control technologies. However, the Wallingford project, which provides approximately 153,300 TPY of capacity for MSW disposal, is currently operating an energy contract with a very favorable energy price. This contract will terminate in 2009. The result will be the Wallingford's post-contract energy revenues are likely to be significantly lower than they currently are, necessitating a significant increase in tip fees to offset these losses. It has been assumed for planning purposes that the Wallingford facility will cease operating in 2009, and that the capacity it currently provides will no longer be available.

Of the six MSW RRFs shown in Table F-2, all but the Lisbon and Bristol facilities are, in some way, affiliated with the CRRA. Individual community contracts with these facilities all expire between 2008 and 2015. Additional information relating to the key elements of each of the RRF projects is also summarized in Table F-2.

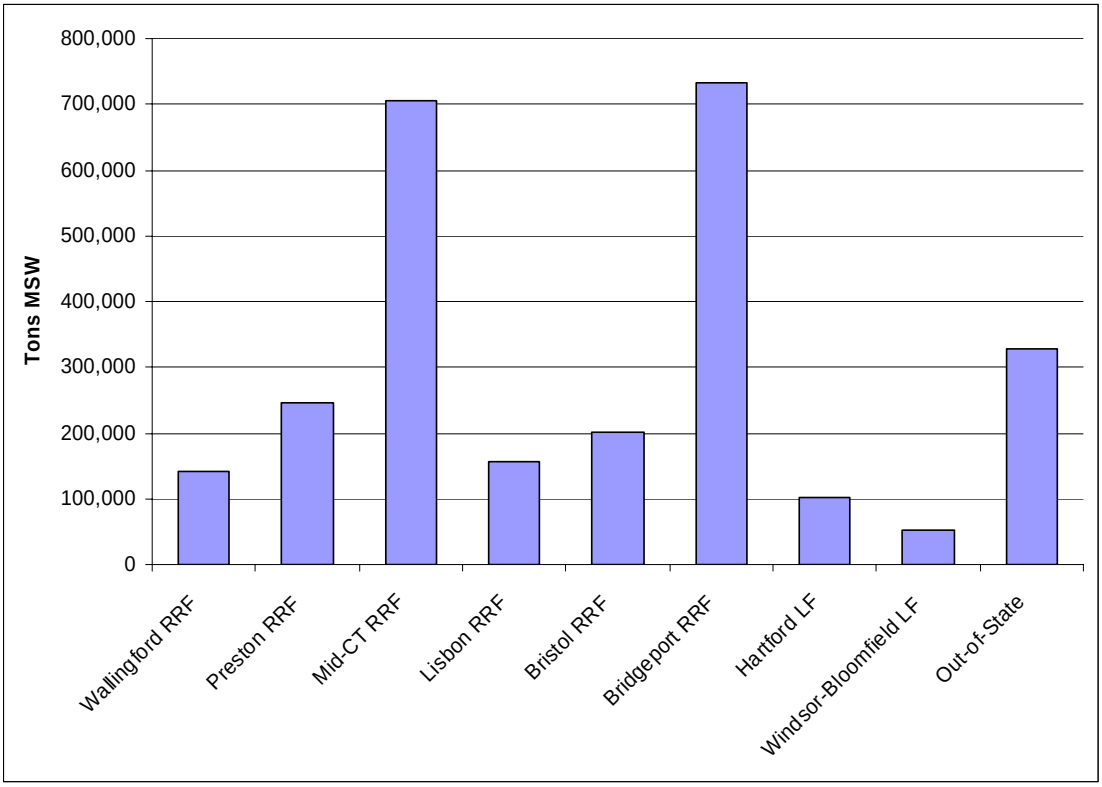
Table F-2
MSW RRFs in Connecticut

Selected Information	Bridgeport RRF	Bristol RRF	Mid-CT RRF	Southeast RRF	Wallingford RRF	Lisbon RRF
Permitted Design Capacity (TPY)	821,250	237,250	888,888	251,485	153,300	193,450
Year Bonds Will Be Paid Off	2008	2014	2012	2015	2010	2020
Operator	Wheelabrator	Covanta	MDC/ Covanta	Covanta	Covanta	Wheelabrator
Number of Towns Contracted (1)	19	14	70	16	5	5
2005 Member Tipping Fee	$69	$66	$70	$60	$57	$60-$66
Fee Covers	Disposal, Recycling Education, Recyclables Processing	Disposal	Transfer, Disposal, Recycling Education, Recyclables Processing at Hartford IPC (no tipping fee), Electronics Recycling	Disposal, Electronics Recycling Education	Disposal, Electronics Recycling	Disposal
Ash Disposal Site	Putnam	Seneca Meadows (NY)	Hartford	Putnam	Putnam	Putnam
Post-Contract Ownership	Wheelabrator	Covanta	CRRA	Covanta	Covanta	Wheelabrator

(1) A total of 129 CT municipalities of 169 are currently under contract for MSW disposal at one of the six in-state MSW RRFs. The Housatonic Resources Recovery Authority ("HRRA") communities (11) have an arrangement with Wheelabrator. Their MSW can be delivered to either the Lisbon or the Bridgeport facility. Currently most of this waste is delivered to the Lisbon Facility, however it is not contracted to that facility. These 11 communities are therefore not included in the 129 contracted/member communities.

Figure F-5 summarizes the amount of CT MSW disposed at each of the Connecticut RRFs, in-state landfills, and exported out-of-state in FY 2004.

Figure F-5
CT MSW Disposal Destinations FY 2004 – Based on Solid Waste Facility Reports Submitted to the CT DEP



Connecticut MSW Landfills

There are two Connecticut landfills permitted to accept MSW. The Connecticut Resources Recovery Authority ("CRRA") operates the Hartford Landfill and uses it primarily for refuse derived fuel ("RDF") process residue, as well as by-pass wastes and wastes that cannot be processed at RRFs. According to CRRA, the Hartford Landfill will close in June2006. Approximately 84,000 tons of Mid-Connecticut RRF processing residue and 26,000 tons of oversize MSW and bulky waste (some of which was "non-processible" waste diverted from the Mid-Connecticut RRF was disposed at the Landfill in 2003.

The only other landfill permitted by the CT DEP to accept MSW is the Windsor-Bloomfield Sanitary Landfill owned by the Town of Windsor. The CT DEP estimates that the landfill had approximately 400,000 cubic yards of capacity remaining as of mid-2005 and is scheduled to close at the end of 2007. Approximately 27,000 tons of CT MSW and 235 tons of MSW from out-of-state were disposed at the Windsor-Bloomfield Landfill in 2003.

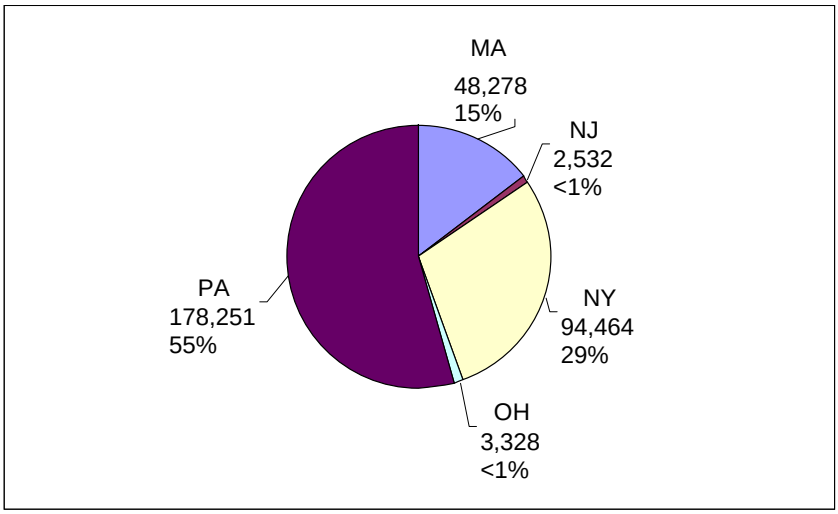
MSW Exported to Out-of-State Landfills and Waste to Energy Facilities (WTEs)

With relatively minimal MSW landfill capacity, and essentially fixed RRF capacity, out-of-state disposal facilities serve as the only option for MSW requiring disposal beyond the existing in-state MSW disposal capacity of approximately 2.3 million tons per year. Thus, while down slightly (based on reported exports) from a peak in FY 2002, out-of-state disposal of MSW has increased tenfold in the past ten years, from approximately 27,000 TPY in FY 1994 to approximately 327,000 TPY in FY 2004. Individual out-of-state disposal facilities and annual MSW tonnage reported sent to those facilities by Connecticut solid waste facilities in FY 2004 are summarized in Table F-3. Figure F-6 provides a graphical representation of MSW exported for disposal from Connecticut to the receiving states, as shown by tons and percent of total.

Table F-3
Summary of CT MSW Disposed Out-of-State (2004)

Facility	State	Tons
CT VY Sanitation Waste Disposal Chicopee LF Facility	MA	45,581
Springfield Resource Recovery, Inc.	MA	2,119
Bondi Island	MA	426
Wheelabrator Millbury, Inc.	MA	152
Massachusetts Subtotal		48,278 (15%)
Seneca Meadows LF	NY	69,870
Westchester Resco (Wheelabrator)	NY	24,582
Hyland Facility Association Landfill	NY	11
New York Subtotal		94,463 (29%)
Better Management Corp. of Ohio	OH	3,328 (<1%)
New Jersey - NA	NJ	2,532 (<1%)
Keystone Sanitation Landfill	PA	124,576
Empire Sanitary LF (Alliance)	PA	32,430
Superior Greentree LF	PA	19,192
Commonwealth Landfill	PA	1,825
Pennsylvania Subtotal		178,251(55%)
Total MSW Exported		326,852 (100%)

Figure F-6
MSW Exported for Disposal (2004)



MSW Imports

Some states also export waste to Connecticut. However, these amounts have decreased over time. Before 1998, Connecticut was a net importer of MSW, but since then the State has been a net exporter. In 2004, Connecticut imported about 52, 000 tons of waste (most from MA, with small amounts from RI, NY, and NJ), for a net export figure of 275,250 tons.

Assessment of the MSW Disposal Capacity Shortfall

As described above, MSW disposal capacity in Connecticut is almost fully utilized and increasing amounts of MSW are being exported to other states. In FY 2005, the estimated shortfall between MSW requiring disposal, and in-state disposal capacity was about 327,000 tons.

This disposal capacity shortfall is projected to grow, unless waste diversion levels are substantially increased. As a part of preparing Connecticut's update solid waste management plan, three disposal scenarios were developed, each using different assumptions for the amount of waste diverted from disposal through source reduction, reuse, and recycling. Scenario One is the "status quo" scenario. The current estimated rate of waste diversion from disposal through source reduction, reuse, and recycling is approximately 30 percent. Scenario One assumes that this 30 percent diversion rate remains constant through 2024, even as the amount of waste increases. Under this scenario, the disposal capacity shortfall would be 1,597,000 tons in FY 2024.

Scenario Two assumes that waste diversion grows to a rate of 40 percent in 2015 and remains constant thereafter. Under this scenario, Connecticut's disposal capacity shortfall in FY 2024 would be 1,074,000 tons.

Scenario Three assumes that waste diversion grows steadily over the next 20 years and reaches a 49 percent diversion rate in 2024. The CT DEP has selected Scenario Three as the basis for this Solid Waste Management Plan. Based on the assumptions in Scenario Three, the disposal capacity shortfall would be 614,000 tons in FY 2024.

In terms of ash disposal capacity for RRFs, adequate capacity is available at the Putnam Ash Landfill through 2019, assuming a reduction of 46,000 tons ash residue due to the closing of the Wallingford facility and no new additional in-state RRF capacity is developed.

RRF Ash Residue Disposal

Connecticut's six MSW RRFs generated approximately 551,000 tons of ash residue from combustion of 2.2 million TPY of MSW. Two landfills permitted to accept and dispose this material; the Hartford Landfill, owned by CRRA, and the Putnam Ash Landfill, privately owned and operated by Wheelabrator Putnam Inc ("WPI"), a subsidiary of Waste Management Inc ("WMI").

The ash monofill section of the Hartford Landfill currently only accepts ash residue from the Mid-Connecticut RRF and is estimated to close in October of 2008. Ash residue generation from the Mid-Connecticut RRF averaged approximately 166,000 TPY for the 5 years period from FY2000 through FY2004. CRRA has initiated a search for acceptable sites with the potential to accept ash residue from all six RRFs for a period of 30 years and has identified three sites with appropriate hydrogeologic conditions.

As indicated in Table F-4, four RRFs dispose of a total approximately 343,000 TPY of ash residue at the Putnam Ash Landfill in 2004. This landfill's Permit requires that enough landfill capacity be reserved to accommodate ash residue from current Connecticut RRF customers (four as listed in Table F-4.) through the year 2018. As of the end of 2004, the Putnam Landfill had enough remaining capacity to manage over 6.7 million tons of residue. Ash residue from the Bristol RRF is currently disposed outside the State. The Bristol RRF produces approximately 45,000 to 50,000 TPY of ash residue and recently signed a contract for transportation to and disposal at the Seneca Meadows Landfill in Waterloo, NY through July 1, 2008.

Table F-4
RRF Ash Residue Disposed (FY2004)

RRF Facility	Disposal Facility	Tons Disposed FY 2004
Mid-CT	Hartford Landfill	173,928
Bridgeport	Putnam Ash Landfill	173,925
Lisbon	Putnam Ash Landfill	51,419
Southeast	Putnam Ash Landfill	71,136
Wallingford	Putnam Ash Landfill	46,575
Total Ash Disposed In CT		516,983
Bristol	Seneca Meadows, NY	47,836
Total RRF Ash Residue Disposed		564,818

Bulky Waste Management

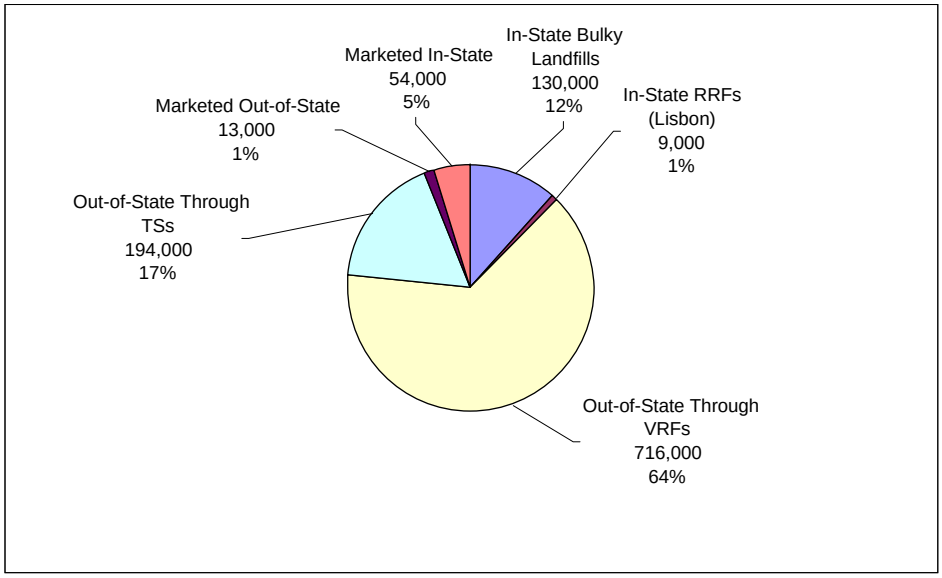
Bulky waste is included in the definition of special wastes in Connecticut's RSCA Section 22a-209-1. These regulations state that bulky waste means landclearing debris and waste resulting directly from demolition activities other than clean fill. The definition does not include construction debris, although much of this material is typically disposed as bulky waste. In practice, debris resulting from building construction activities is typically included in the collection, processing and disposal of bulky wastes. Land clearing debris often handled separately from construction and demolition debris and may be disposed at bulky waste landfills or processed into wood chips for use as mulch or compost and sometimes is exported for combustion as hog fuel outside the State. Furniture, appliances, carpeting and mattresses, normally referred to as "bulky waste" in most states, is typically referred to as oversized MSW waste in Connecticut. However, in practice, oversized MSW waste is often managed and commingled with bulky waste in Connecticut.

The Department has "bulky waste" data (which may include Construction and Demolition ("C&D") waste, oversized MSW, etc.) reported by Connecticut regional (multi-town) transfer stations and Connecticut landfills , and C&D waste data reported by Connecticut C&D volume reduction facilities; that data serves as the basis for the description of "bulky waste" generation and disposal that follows. This discussion, however, refers only to C&D and oversized MSW. Land clearing debris, while technically included in the State's legal definition of bulky waste, is generally managed differently. More information on the management of bulky waste, land clearing debris and other special wastes is provided in Appendix D (Current Diversion Practices) and Appendix H (Special Waste Management).

As shown in Figure F-7, in FY2004 about 1.1 million tons of Connecticut C&D waste/oversized MSW were transferred through Connecticut regional solid waste transfer stations, processed at Connecticut C&D volume reduction facilities or

disposed in Connecticut landfills. About 0.89 million tons were transported to one of the State's 20 C&D volume reduction facilities ("VRFs"), and about 0.19 million tons were sent to one of the regional transfer stations permitted to accept C&D waste/oversized MSW. The vast majority of bulky waste taken to regional solid waste transfer stations is sent to landfills, although a small amount goes to VRFs for further processing and recycling. Most of the C&D waste/oversized MSW generated in FY 2004 and processed through Connecticut C&D volume reduction facilities and Connecticut solid waste transfer stations was disposed out-of-state.

Figure F-7
Final Disposition of CT C&D waste/oversized MSW Which Has Passed Through CT C&D Volume Reduction Facilities or CT Regional Solid Waste Transfer Stations
FY 2004 [Total 1.1 million tons]



Transfer Stations

C&D waste/oversized MSW received by in-state transfer stations is generally either transferred to in-state bulky waste landfills or VRFs, or transferred out-of-state. There are 84 transfer stations in Connecticut that are permitted to accept bulky waste and/or C&D wastes, or asbestos (one facility). Eighty of these transfer stations are municipally-owned and four privately owned. Data regarding C&D waste/oversized MSW that is transferred to a solid-waste facility reporting to the CT DEP are not entered in the CT DEP solid waste database. Only data regarding C&D waste/oversized MSW that is transferred to destinations that do not report to the CT DEP are entered and tracked through the database.

C&D Volume Reduction Facilities (VRFs)

As of August, 2005, there were 20 VRFs in Connecticut. One is municipally-owned and operated C&D VRF for use by the municipality and 19 privately-owned and operated VRFs receiving and processing C&D waste and/or "bulky waste" (excluding land clearing debris). These facilities have a combined permitted capacity of approximately 11,000 tons per day, or 2.7 million TPY, assuming facilities operate 260 days per year. This capacity, however, is for all of the waste streams these facilities accept.

C&D VRFs sort construction and demolition waste, process it for recycling, and reduce the volume of waste to enable more cost-effective transport, primarily to out-of-state landfills. Processing activities typically include sorting, separating, chipping, shredding, and compacting. C&D VRFs vary greatly according to the types of waste processed, processing techniques (manual versus mechanical), and the quality of the end products. Materials recovered for reuse and recycling include: brick and block, ferrous metal, and clean untreated wood. VRFs also produce chipped demolition wood that may be suitable for combustion (hog fuel). Some residue from VRF processing may contain a concentration of highly contaminated materials and thus require disposal at lined landfills (paint containers, mixed metal packaging, small fragments of paint chips, soil, wood, plastics, insulation, and wallboard).

Connecticut Bulky Waste Landfills

There are 25 active landfills in Connecticut that accept C&D waste/oversized MSW waste and/or C&D waste. Only one of these is privately owned and operated. Most of the remaining landfills serve only their communities. Most of these landfills are former MSW landfills that the CT DEP has approved for short-term cost-effective disposal of bulky wastes by allowing a reduction in the daily cover requirement from daily to weekly.

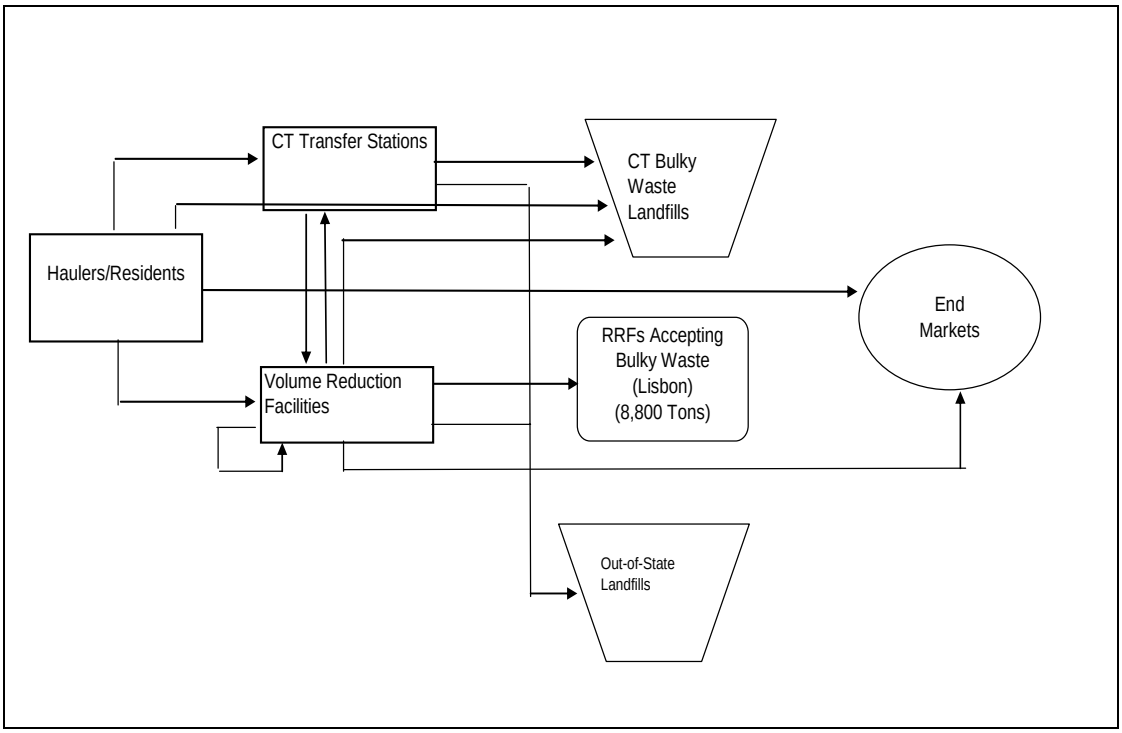
The CT DEP does not keep records of remaining bulky waste landfill capacity. For planning purposes it has been assumed that all of the bulky waste landfills with the exception of Manchester will reach capacity, or the end of their permitted operating period, by the end of 2007. The Manchester Landfill reports that based on a permitted filling rate of 125,000 TPY, capacity will be depleted by late 2015. It is possible that this landfill will reach capacity before that point, if it accepts more than 125,000 tons per year.

Bulky Waste Export to Out-of-State Landfills

Transfer stations and C&D VRFs reported sending approximately 909,350 tons of bulky waste to 35 out-of-state landfills in five states in FY 2004. More than three-quarters of this bulky waste was disposed in two states, with almost half of the total going to Ohio, and the remainder to landfills in Pennsylvania. The future viability and costs of disposal in each of the major destination states is described in more detail in Appendix G. Figure F-8 shows the solid waste facility flow of bulky waste (excluding land clearing debris) in Connecticut. C&D and oversized MSW may be hauled

directly out-of-state from the site of generation or it may be delivered to transfer stations, volume-reduction facilities, or bulky waste landfills. The final destinations for Connecticut-generated C&D waste and oversized MSW are (1) in-state disposal (bulky waste landfill or Lisbon RRF), (2) in-state or out-of-state markets for recycled materials, or (3) out-of-state disposal. Some VRFs in Connecticut are known to be processing waste and shipping fines to out-of-State landfills for use as alternative daily cover. This tonnage would be included in the out-of-state disposed tons. As Figure F-8 shows, in some instances smaller VRFs and transfer stations may deliver some bulky waste to each other.

Figure F-8
Flow of C&D and Oversized MSW Waste Generated in Connecticut



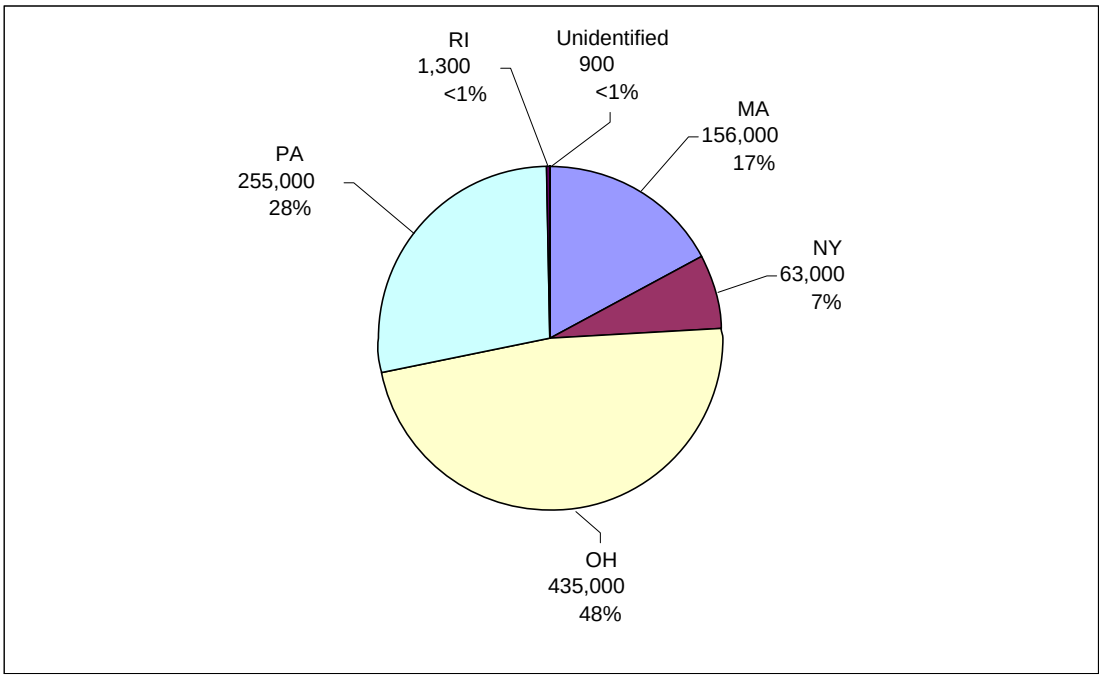
In FY 2004, it is estimated that approximately 1,127,000 tons of C&D and oversized MSW was processed or disposed by Connecticut Solid Waste Facilities. Of this amount:

- 139,000 tons were disposed in Connecticut;
- 911,000 was disposed out-of-state;
- 67,000 tons of C&D debris were recycled and marketed; and
- 10,000 tons of C&D materials were recycled by the Connecticut Department of Transportation (" CT DOT")

Most of the Connecticut C&D waste/oversized MSW generated in FY 2004 and transferred through Connecticut multi-town transfer stations or processed through Connecticut C&D VRF's was disposed out-of-state.

Figure F-9 shows the amount and disposal destination by state for that C&D waste/oversized MSW. Only waste reported transferred out-of-state by Connecticut VRFs and transfer stations is included. It is possible that some C&D waste/oversized MSW is transported out-of-state directly, for disposal or reuse.

Figure F-9
Summary of CT-Generated C&D waste/oversized MSW Reported Disposed Out-of-State
by CT Multi-town Transfer Stations and CT C&D Volume Reduction Facilities
FY 2004



C&D Recycling

Materials recovered and marketed from bulky waste at Connecticut C&D VRFs typically include brick and block, clean wood, wood chips, scrap metal, and very small amounts of old corrugated cardboard (OCC). C&D VRF reports to the CT DEP of C&D waste diverted for recycling to markets in and outside the State total 67,000 tons for FY 2004 as shown in Figure F-7. It is possible that some C&D materials are reused and/or recycled without being reported through VRFs. Little to no oversized MSW is recycled at VRFs in Connecticut.

In addition to the above materials that are reported recycled through Connecticut C&D VRFs, The CT DOT reports that they also recycle certain materials, which would not be reported through these means. In FY 2003, CT DOT reported that they reused:

- 7,352 tons of clean wood; and
- 2,547 tons of steel.

In addition CT DOT reused 393,984 tons of clean fill, consisting of bituminous asphalt and concrete. Again, clean fill is not categorized as a solid waste in Connecticut and as a result the CT DEP does not get complete tonnage reports on amounts generated and reused/recycled. However, because of the way C&D VRF's report to CT DEP, clean fill is probably included in the C&D tonnages reported received at those facilities and some is included in their marketed reports as well.

Assessment of the Bulky Waste Disposal Capacity Shortfall

Disposal capacity for bulky wastes in Connecticut is minimal. There are 25 landfills in Connecticut that accepted C&D waste/oversized MSW in FY 2004. Most of these are small, municipal bulky waste landfills that only serve their own residents, and are nearing closure. Only the following relatively large bulky waste landfills were considered for this analysis, including:

- The Hartford Landfill;
- The Manchester Landfill;
- The Glastonbury Landfill; and
- The Windsor-Bloomfield Landfill.

According to estimates of remaining cubic yards, and assuming that each of these landfills continues to receive approximately the same amount of C&D waste it receives today, the following is expected:

- The MSW and bulky waste sections of the Hartford Landfill is expected to reach capacity and close in June 2006
- The Windsor Landfill is expected to reach capacity and close in December 2008.
- The Manchester Landfill is expected to reach capacity and close in 2022 (although its current permit expires in 2015, it is assumed that it will be granted a permit extension).
- The Glastonbury Landfill will have capacity for approximately 70 years, if it continues to accept C&D/ oversized MSW from Glastonbury residents only.
- The State is projected to a C&D waste/oversized MSW disposal shortfall of 940,000 in FY 2005.

The net result is that the shortfall in disposal capacity for Connecticut generated bulky waste is projected to continue to grow. As stated above, in FY 2005 the shortfall is projected to be 940,000 tons and is expected to grow to as much as 1.1 million tons by 2010, unless diversion rates for bulky waste grow rapidly and substantially.

Appendix G
COST ANALYSIS OF OUT-OF-STATE DISPOSAL OPTIONS

Introduction

Solid waste landfills outside the State of Connecticut that meet Subtitle D regulations provide a potentially viable option for disposal of MSW, ash residue from Connecticut RRFs, and bulky waste tonnages that exceed the existing in-state capacity of RRFs and solid waste landfills. Nationwide, the private solid waste management industry has invested heavily in the development of landfill capacity in the past 10 years, increasing nationwide landfill capacity from 5.3 billion tons of capacity in 2000 to over 6.6 billion tons in 2004. Due to the existence of many large MSW and construction and demolition ("C&D") disposal facilities with significant amounts of disposal capacity in the Mid-Atlantic and Mid–West states, the options for Connecticut municipalities and private haulers are many.

This Appendix provides an analysis of the costs associated with the utilization of representative MSW and C&D landfills in the states that have long-term disposal capacity, currently receive large quantities of solid waste from other states, and are most cost effectively accessed from Connecticut. For MSW, cost analyses are provided for MSW landfills in the following states:

- New York;
- Ohio;
- Pennsylvania; and
- Virginia.

While some MSW from Connecticut has historically been disposed in landfills in the State of Massachusetts, increasing in-state demand for capacity and the depletion of most of the existing landfill capacity by 2012 preclude them from consideration as viable long- term disposal alternatives.

For ash residue, a cost analysis of utilizing representative ash residue landfills in the following states is presented:

- Massachusetts;
- New York; and
- Pennsylvania.

For bulky wastes, a cost analysis of utilizing C&D landfills is presented. The analysis focuses on the following states that are currently receiving bulky waste exported from Connecticut:

- Massachusetts;
- New York;
- Ohio; and
- Pennsylvania.

A description of current capacity and identification of representative facilities for MSW, bulky waste and ash residue is followed by an analysis of the cost of each of the essential system components associated with utilization of out-of-state disposal options. These include:

- Transfer;
- Transportation; and
- Tipping and other fees for disposal.

It should be emphasized that future competitive MSW tipping fees offered by the six resources recovery facilities in Connecticut will be largely determined by the all-inclusive cost of transferring/transporting and disposing of waste at the most economically competitive alternative; i.e., landfills located outside of the State of Connecticut. In order to develop an estimate of the cost of such competing alternatives, an analysis consisting of the following steps was conducted:

- Identification of the location of large landfills, that accept significant quantities of out-of-state waste. MSW, ash residue and bulky waste landfills located in Massachusetts, Pennsylvania, eastern Ohio, Virginia and western New York are included, inclusive of tipping fee information charged at the various types of landfills.
- Estimation of the cost to construct and operate a "generic" truck-based transfer station/volume reduction facility designed to transfer 700 – 1,000 TPD of MSW or bulky waste to facilities outside the State. This was accompanied by developing an estimate of the cost of transporting, via truck, the waste from the transfer station to the various out-of-state landfills identified in the first step above.
- Development of a cost estimate to construct and operate a "generic" rail-based transfer station designed to transfer 700 – 1,000 TPD and the cost of the necessary equipment to allow the transportation of solid waste via rail from the transfer station to selected out-of-state landfills with rail access close by.

Out-of-State Disposal Options

The first step in performing the cost analysis was to review information from State waste management agencies regarding landfills located in those states previously identified as the most likely recipients of MSW, ash residue, and bulky waste from Connecticut. Landfills included are those that: (1) received the greatest quantities of waste generated outside the state in which they are located; and (2) had significant remaining disposal capacity. Information was also obtained, to the degree possible,

regarding the current market-based tipping fee charged by landfills located in each state. A summary of the information for each type of waste for each state investigated is provided below.

Obtaining reliable data on the current tipping fees actually being charged to large-volume customers at privately owned disposal facilities for MSW, ash residue or bulky waste is problematic at best. Owners of privately owned landfills located in Pennsylvania, Virginia, eastern Ohio, and western New York were contacted as part of this effort. Most of the responses received fell into one of the following categories:

- Respondent would not give information – considered tip fee information to be proprietary;
- Requests for information would have to be submitted in writing and forwarded to corporate headquarters where the request would be considered; or
- The only information they would provide was the posted gate rate.

Based on this lack of direct response from the owners of the facilities, public-sector clients were contacted, where possible, in addition available information on recent bids was reviewed, and publicly available information and data were reviewed. Using this approach, a range of tipping fees was developed. It is important to note that in most instances, the posted gate rates that are provided in the following tables are higher than the tipping fee that would be charged as the result of the execution of a long-term disposal contract involving a significant quantity of waste.

MSW Disposal Options

New York Disposal Facility Options

The New York State Department of Environmental Conservation ("NYSDEC") reports that there are 30 active MSW landfills located in the State: 12 of which are permitted to accept more than 500 TPD. Eight of the landfills are privately owned. Both the High Acres and Seneca Meadows landfills were reported to have in excess of 20,000,000 tons of remaining disposal capacity as of the end of 2003. Based on the review of State landfill information and CT DEP reports listing facilities currently receiving Connecticut MSW, the landfills presented in Table G-1 are representative of the MSW landfills in New York for 2004.

Table G-1
Representative MSW Landfills in New York

Landfill	Location	Reported Disposal Fee ($/ton)	Existing Capacity (tons as of 1/1/2004) (1)
Seneca Meadows	Seneca Falls, NY	50.00	11,147,730
High Acres	Fairport, NY	45.00	27,962,487
Ontario County	Stanley, NY	25.00	3,049,103
Hyland	Agelica, NY	30.00	1,429,229
Monroe County	Riga, NY	44.00	9,348,737

(1) New York Department of Environmental Conservation data on active MSW Landfill in New York State.

Since tipping fees generally decrease as one moves farther west in the State (away from urban areas with large demand for disposal capacity) they provide the most cost-effective landfill options in the State. For the purposes of this analysis, it has been assumed that a market-based tipping fee of approximately $28 to $30 per ton would be reasonable for MSW disposal in central to western New York. Estimated transportation costs to access these facilities are provided in the transportation cost analysis section later in this Appendix.

Ohio Disposal Facility Options

In early 2005, the Division of Solid and Infectious Waste Management of the State of Ohio Environmental Protection Agency ("OEPA") reported that there were 41 licensed MSW landfills in Ohio. Private industry owns and operates 27 of these facilities. OEPA further reported that these 41 MSW landfills had a total of 513,212,000 cubic yards of airspace available, representing a useful life ranging from 22.3 to 31.2 years, depending upon assumptions regarding the rate of fill. An additional 292,000,000 cubic yards of airspace is proposed and is pending OEPA approval. In 2003, MSW landfills in Ohio received approximately 18 million tons of solid waste including over 2 million tons of out-of-state deliveries as shown in Table G-2.

Table G-2
States that Export MSW to Ohio Landfills

State	Tons Delivered in 2003
Massachusetts	99,061
Connecticut	228,697 (1)
New Jersey	431,982
New York	889,376
Pennsylvania	457,394
Total	2,106,510

(1) Includes some waste categorized as bulky waste by CT but called MSW in Ohio

The average landfill tipping fees in the northeast and southeast regions of Ohio during the period of 1997 – 2002 is shown in Table G-3.

Table G-3
Average Landfill Tipping Fees for MSW in Ohio
($ per Ton)

Year	Northeast Region	Southeast Region
1997	28.60	28.00
1998	30.37	26.85
1999	30.86	26.85
2000	32.67	27.11
2001	30.73	28.00
2002	30.83	27.86

A review of the information in Table G-3 indicates that the average tipping fee in the eastern regions of Ohio remained relatively flat at $28 - $30 per ton during the 1997 through 2002 period. OEPA representatives indicate that during the last three years landfill tipping fees have continued to remain relatively flat. Therefore, a market-based tipping fee of approximately $25 to $30 per ton would be reasonable to assume for MSW disposal in Ohio.

The eastern Ohio landfills shown in Table G-4 are considered to be representative of MSW landfill options in Ohio. Estimated transportation costs to access these facilities are provided in the transportation cost analysis later in this Appendix.

Table G-4
Representative Eastern Ohio MSW Landfills

Name of Landfill	Location	Reported Disposal Fee ($/ton)	Existing Capacity (Tons) (1)
BFI Carbon Limestone	Mahoning County, OH	30.00	39,727,043
American Landfill	Stark County, OH	20.00	8,754,655
Countywide Landfill	Stark County, OH	28.00	71,374,428
BFI Lorain County	Lorain County, OH	45.00	32,331,043
Suburban South RDF	Perry County, OH	27.50	16,197,862

(1) Ohio EPA 2003 MSW Landfill Remaining Capacity , capacity as of 1/1/2004

Pennsylvania Disposal Facility Options

The Pennsylvania Department of Environmental Protection ("PA DEP") reports that there are currently 51 active MSW landfills located in the State of Pennsylvania. Over the recent past, Pennsylvania has been a major destination for solid wastes from most states in the Northeast. However, the State has recently undertaken measures to reduce the delivery of solid waste from out-of-state. Pennsylvania has accomplished a reduction in out-of-state deliveries by imposing a $6.25 per ton "Growing Greener Tax" which is imposed on landfills but not on waste-to-energy facilities. Landfills are also required to charge a minimum of $1.00 per ton as a host fee to be paid to the jurisdiction in which the landfill is located. The governor of Pennsylvania has proposed increasing the tax further from $6.25 to $9.00 per ton.

Finally, since Pennsylvania has no landfill serviced by rail, more waste from the Northeast is beginning to be diverted to large landfills in Virginia that do have rail service.

Information developed by PA DEP was reviewed, in which landfills were identified that: (1) accept significant quantities of solid waste from out-of-state; (2) have permitted capacity of at least 700 TPD; and (3) have a significant amount of remaining disposal capacity. Based on those criteria, the list of representative State of Pennsylvania landfills was developed, which is provided in Table G-5.

Table G-5
Representative Eastern Pennsylvania MSW Landfills

Name of Landfill	Location	Reported 2004 Disposal Fee ($/ton)	Remaining Capacity (tons) (1)
Alliance Sanitary LF	Taylor, PA	49.00	26,860,081
Grand Central LF	Pen Argyl, PA	56.00	7,506,868
Keystone Sanitary LF	Dunmore, PA	71.00	12,595,055
GROWS LF	Morrisville, PA	54.00	7,036,465
Conestoga/New Morgan	Morgantown, PA	54.00	18,154,359

(1) Source: Chartwell's Directory & Atlas of Solid Waste Disposal Facilities 2004, capacity remaining as of 1/1/05.

During 2004, a telephone survey of tipping fees being charged at the large Pennsylvania landfills was conducted. The results of that survey indicated a reported range of tipping fees from $32 to $53 per ton.

In addition, other existing information regarding tipping fees was reviewed. These sources indicate that tipping fees decline as one moves further west in the State. Within a 50-mile radius of the Delaware Valley there are three large privately owned landfills, which appear to be receiving a market-based tipping fee of approximately $35 to $40 per ton. These facilities are reported to be operating close to their permit limits and are reportedly increasing their tipping fees.

Within a 100-mile radius of the Delaware Valley are four additional large, privately owned landfills, which appear to be receiving a market-based tipping fee of approximately $30 to $35 per ton.

Based on this review, a market-based tipping fee in the range of $30 to $35 per ton represents a reasonable planning estimate for those landfills located in eastern Pennsylvania, with tipping fees of $20 to $25 per ton available in the western part of the State. Estimated transportation costs to access these facilities are provided in the transportation cost analysis section later in this Appendix.

Virginia Disposal Facility Options

Although no solid waste was reported to be delivered to Virginia from Connecticut in FY 2003, it is evolving as a major destination for solid waste generated in the Northeast, particularly with the $7.25 per ton tax (total fees) now being charged by the Commonwealth of Pennsylvania. The June 2005 report, "Solid Waste Management in Virginia During Calendar Year 2004" prepared by the Department of Environmental Quality ("DEQ") of the Commonwealth of Virginia indicates that in 2004, 17,883,000 tons of solid waste was disposed in Virginia, of which 5,893,000 tons originated outside of Virginia. The deliveries of out-of-state waste in 2004 increased by 7.4 percent over the deliveries received in 2003, which further reflect the actions taken

in Pennsylvania. The Virginia DEQ estimates that at the current rate of deliveries, Virginia has approximately 16.1 years of available MSW disposal capacity remaining.

Information from the Virginia DEQ regarding waste deliveries to specific landfills in 2004 and the annual capacity of those landfills was also reviewed. Based on that review, we identified those Virginia landfills shown in Table G-6, which could receive significant quantities of solid waste from outside the State.

Table G-6
Representative Virginia MSW Landfills

Name of Landfill	Location	Reported Disposal Fee ($/ton)	Remaining Capacity (Tons) (1)
Atlantic Waste Disposal	Waverly, VA	40.00	46,510,211
Charles City Landfill	Richmond, VA	38.00	15,527,359
King and Queen Landfill	Little Plymouth, VA	50.00	13,494,465
King George Landfill	King George, VA	39.00	14,516,668
Middle Pennsylvania Landfill	Gloucester, VA	36.00	19,481,474
Shoosmith Landfill	Chester, VA	40.00	5,979,042

(1) Solid Waste Management the State of Virginia during Calendar Year 2004, Virginia DEQ. Remaining capacity as of 1/1/05.

Published information regarding disposal fees in Virginia has also been reviewed. This information indicates that the published tipping fees range from approximately $27.50 to $50 per ton. As part of this review, a public solid-waste agency which is considering participating in the development of a 10,000 TPD landfill to be located near the border of Virginia and North Carolina was contacted. The tipping fee that is being discussed for that very large landfill is $18 per ton. Based on this review, a market-based fee for a Virginia landfill could reasonably be expected to range from $18 to $25 per ton, with the low end of the range dependent upon the permitting and construction of this 10,000 TPD landfill in Northeastern North Carolina. In the event that landfill is never developed, the range is estimated to be between $22 and $25 per ton. Estimated transportation costs to access these facilities are provided in the transportation cost analysis section later in this Appendix.

Ash Residue Disposal Options

The quantity of ash residue disposal capacity available in the State of Connecticut is adequate to meet the ash residue disposal needs of the existing six RRFs through the year 2019, assuming no new in-state RRF processing capacity is developed. However, with remaining capacity at the Hartford Landfill ash monofill expected to be depleted within three years, the Putnam Wheelabrator ash landfill will serve as the only in-state alternative. While the CRRA is presently investigating potential sites for a new ash residue landfill in State, the actual development of new in-state capacity is uncertain.

Current ash residue disposal fees in Connecticut range from approximately $25 to $40 per ton. For planning purposes it is prudent to be aware of the cost of utilizing out-of-state alternatives if the need arises. Out-of-state landfills permitted for disposal of ash residue in the following states within cost-effective transportation distance from Connecticut are potentially viable alternatives to existing in-state disposal:

- Massachusetts;
- New York; and
- Pennsylvania.

Massachusetts Ash Disposal Facility Options

There are six ash landfills in the State of Massachusetts. Each of these facilities has been developed in conjunction with, and is related to a single-combustion facility. Some are permitted to accept waste only from the associated combustion facility. With the exception of the Shrewsbury ash landfill, which accepted 23,000 tons of ash from a small Wheelabrator combustion facility in New Hampshire, none of these landfills accepted ash from outside the State in 2004. While this facility could take ash from Connecticut RRFs, it would seem reasonable to conclude that use of the Putnam Ash Landfill would be a more cost-effective alternative. Therefore, it is unlikely that ash landfills in Massachusetts will be a viable alternative for ash generated in Connecticut in the future.

New York Ash Disposal Facility Options

The NYSDEC reports that there are 30 active MSW landfills located in the State; all of which are permitted to accept ash residue from incinerators and waste-to-energy facilities. Representative landfills with large remaining capacities are shown in Table G-1. In July 2005, the Bristol Resource Recovery Facility signed an ash residue transportation and disposal contract for a total price of $54.50 per ton. The contract allows disposal at either the Ontario County or Seneca Meadows landfill. Assuming a transportation cost of approximately $30.00 to $35.00 per ton for the 600 mile trip (lower than for MSW as aggregate can be backhauled), it is estimated that the tipping fee is approximately $20 to $25 per ton.

Since tipping fees generally decrease as one moves farther west in the State, landfills in central and western New York provide the most cost-effective landfill disposal options in the State. Assuming a market-based tipping fee of approximately $20 to $25 per ton would be reasonable for ash residue disposal in New York for the purposes of this analysis.

Pennsylvania Ash Disposal Facility Options

In Pennsylvania, all MSW landfills constructed after 1988 must be double-lined. Those that are, can accept ash for disposal. Tip fees are the same for ash as for MSW, and the State fees are applied to all waste disposed.

Bulky Waste (C&D) Disposal Options

As illustrated in Table G-7, solid waste facilities that handled bulky waste in Connecticut reported sending approximately 909,000 tons of bulky waste to landfills outside the State in FY 2004. Since disposal facility options for bulky waste outside the State of Connecticut are typically categorized in those states as facilities that take C&D, we have chosen to refer to bulky waste from Connecticut as C&D waste in this section of the analysis.

Table G-7
Reported Tonnage of Bulky Waste Disposed Out-of-State
FY 2004

	Destination State (1,000 Tons)					
	MA	NY	OH	PA	RI	Total
Tons Disposed	156	63	433	255	1	909
Percent of Total	17.2	6.9	47.6	28.1	0.1	100.0

Massachusetts C&D Landfill Options

All landfills permitted to accept MSW in Massachusetts are also permitted to accept C&D wastes. Currently there are 19 MSW landfills in the State and three accepted C&D from outside the State (all three accepted C&D from Connecticut) in 2004.

According to CT DEP records, approximately 17 percent of the 909,000 tons of bulky waste exported from Connecticut in FY 2004 was exported to facilities in Massachusetts. However, some of this material is known to have been used as alternative daily cover, which in some states is not considered "disposal."

Discussions with Massachusetts DEP staff confirmed that the State is currently promulgating regulations that will ban asphalt, bricks, concrete, metal and wood from Massachusetts's landfills. These regulations are expected to take effect in July 2006 and will effectively preclude Massachusetts's landfills as viable alternatives for mixed C&D waste generated in Connecticut. However, there is extensive C&D processing infrastructure and capacity available in the State, with 14 facilities permitted as processing facilities, which can accept, and process mixed C&D from Connecticut. Telephone calls to three of these facilities revealed tipping fees of approximately $80 to $100 per ton.

New York C&D Landfill Options

As of May 2005, there were 108 Registered Land Clearing Debris Landfills, three acres or less, requiring, at a minimum, a compacted soil liner; and 18 Permitted

Construction and Demolition Debris Landfills, greater than three acres, requiring, at a minimum, a single composite liner with a leachate collection and removal system.

The CT DEP reports that approximately 7 percent of C&D waste exported from the State in FY 2004, 63,000 tons, was sent to six landfills in the State of New York.

To develop an estimate of average tipping fees, three of the five sites that the Department reported as receiving C&D from Connecticut were contacted. The results, summarized in Table G-8, reveal reported tipping fees in the range of $30 to $50 per ton.

Table G-8
Representative Landfills in New York Receiving Bulky Waste from Connecticut

Named Landfill	Location	Reported Disposal Fee ($/ton)	Existing Capacity (tons) (1)
Seneca Meadows	Seneca Falls, NY	35.00-50.00	11,147,730
Niagara Recycling	Niagara Falls, NY	45.00	1,675,000
Hyland	Agelica, NY	30.00	1,429,229

(1) New York Department of Environmental Conservation data on active MSW Landfills in New York State and includes total capacity for all solid waste.

Assuming a market-based tipping fee of approximately $28 to $30 per ton is reasonable for bulky waste disposal in New York for the purposes of this analysis.

Ohio C&D Landfill Options

The Ohio EPA reports that there were 71 licensed C&D Landfill Facilities operating in the State as of December 2004. The plethora of facilities is due to the fact that, in Ohio, local health department officials have primacy for siting and operation of C&D Landfill facilities. Ohio EPA has no direct jurisdiction over either siting or operation.

The Department estimates that approximately half of the 909,000 TPY of C&D waste exported from the State of Connecticut in FY04 was sent to fourteen separate landfills in the State of Ohio.

New regulations permit local health departments to assess a $0.40 per ton fee to provide funding for increased inspection. In addition, the local health department may require groundwater monitoring at the facility. Lastly, increased efforts are required to ensure that incoming material has not been "processed" to the point where it is unrecognizable as C&D and may in fact include MSW. In October 2005, the Ohio Environmental Protection Agency reported that recent tests have found high levels of lead, arsenic, cyanide and other metals, plus pesticides and other man-made chemicals leaking out of these lightly regulated landfills.

Even with these changes in the regulations and increased oversight, discussions with Ohio EPA staff suggest that the State's less stringent requirements will continue to

make Ohio C&D landfills a relatively inexpensive disposal option for exporters of C&D from Connecticut and the entire Northeast.

Tipping fees for C&D in Ohio are extremely low due to the availability of enormous landfill capacity and the relatively lenient environmental regulations described above. To confirm an average range of tipping fees we attempted to contact bulky waste destinations reported to the Department. No information was available for several of the destinations listed and some of those contacted stated that they only took MSW from Connecticut. Information that was obtained is summarized in Table G-9. Based on this information and follow-up inquiries to Ohio EPA staff and the Construction Materials Recycling Association ("CMRA"), it is reasonable to assume that the market-based tipping fee for C&D in the State of Ohio is in the range of $10 to $15 per ton.

Table G-9
Eastern Ohio C&D Debris Landfills Receiving Bulky Waste from Connecticut

Named Landfill	Location	Reported Disposal Fee ($/ton)
A&L Salvage	Lisbon, OH	9.60
LaFarge	Lordstown, OH	13.50 to $16.50 (1)
Total Waste Logistics (LAS)	Girard City	12.60

(1) Dependent upon size of rail car.

The Ohio DEP does not track C&D facility operations as it does for MSW landfills. Information regarding remaining capacity is not available. However, it is reasonable to assume that the 71 C&D landfills have capacity in excess of the 500,000,000 cubic yards of airspace reported for the 41 MSW landfills in the State.

Pennsylvania C&D Landfill Options

The CT DEP reports that approximately 30 percent of the C&D waste exported from the State in FY 2004 was sent to five separate landfills in the State of Pennsylvania. The PA DEP reports that there are six Construction and Demolition Waste landfills in operation at the present time. In addition, most of the 51 MSW landfills are also permitted to accept C&D. However, due to the surcharge imposed on all waste disposed at MSW landfills, and the fact that no Pennsylvania landfills have rail access, Pennsylvania is becoming less attractive as an option for disposal of C&D waste from outside the State.

To confirm an average range of tipping fees, attempts were made to contact Connecticut bulky waste destinations in Pennsylvania reported to the CT DEP. No information was available for some of the destinations listed and some of those contacted stated that they only took MSW from Connecticut. Information that was obtained is summarized in Table G-10.

Table G-10
Representative Pennsylvania Landfills that Receive Connecticut Bulky Waste

Named Landfill	Location	Reported Disposal Fee ($/ton)	Existing Capacity (tons) (1)
County Environmental	Clarion County, PA	46.00	NA
Keystone Sanitary LF	Dunmore, PA	71.00	NA
Phoenix Resources	Tioga County, PA	54.00	NA
Environmental Recycling	Taylor, PA	50.00	NA

(1) Pennsylvania Department of Environmental Protection does not make remaining landfill capacity publicly available.

Based on this review, a market-based tipping fee in the range of $30 to $35 per ton represents a reasonable planning estimate for those landfills located in eastern Pennsylvania, with lower pricing as one moves further west within the State.

Transfer and Transportation Costs

Truck transfer represents the most frequently used method of transporting solid waste from a specific area to disposal facilities located outside the area. Truck transfer of solid waste is still most commonly used because it does not depend on access to rail lines, the turn-around time of equipment is relatively short, and it provides maximum flexibility in routing and destination. However, the cost of truck transfer is highly correlated with fuel costs and drivers' salaries, and its cost effectiveness decreases as the distance increases. As a result, the development of rail-haul systems is rapidly evolving both in Connecticut and nationwide, and thus cost estimates for rail haul to selected disposal facilities is also included in this analysis.

Transfer Costs

In order to utilize the long-haul option to deliver solid waste to disposal facilities located outside Connecticut, it will be necessary to have access to a transfer station for MSW or volume reduction facility ("VRF") for bulky wastes to allow collection vehicles to unload these wastes for consolidation into transfer vehicles. Estimates of the capital and operating and maintenance ("O&M") costs to build and operate a transfer station or VRF (which are assumed will be privately-owned and operated) were developed for this analysis.

An R.W. Beck proprietary computer model (the "Transfer Station Cost Model") which estimates both the transfer station costs and truck/rail transfer costs was utilized to develop these estimates. The model uses estimates of capital and operating costs of a transfer station sized to accept all the solid waste to be transferred and the distance to the out-of-state disposal facility to estimate transportation costs.

The Transfer Station Cost Model is based on an analysis of the capital and O&M costs of numerous operating transfer stations and/or VRFs located throughout the Untied States. The output of this analysis includes estimates of the fixed and variable cost components for both the capital and O&M portions of the transfer station costs. The Transfer Station Cost Model provides an estimate of costs for transfer stations/VRFs of varying design capacities. In addition, the cost estimates developed by the Transfer Station Cost Model have been reviewed for accuracy against recently constructed facilities.

In view of the fact that MSW and bulky waste tonnage exceeding in-state disposal capacity is not concentrated in one area, but rather dispersed across the State, an average transfer station/VRF size of 700 to 1000 TPD has been assumed. Moreover, transfer stations of this size are representative of facilities being constructed in the Northeast today.

The capital cost components of a transfer station/VRF include land, building, utilities, site development, material handling and processing equipment, transfer vehicles, loaders, scales and fees for design, permitting and legal services. Provision has also been included for a return on equity investment assumed to be equal to 20 percent. The O&M cost components of a transfer station include labor, utility service charges, station and vehicle maintenance, insurance, taxes, vehicle licenses, facility permit, vehicle operating costs, host community benefits, renewals and replacements and an operator's fee to provide for a level of profit.

Based on the assumptions described above, the cost of transfer at 700 TPD to 1000 TPD facilities transfer stations/VRFs is estimated to be approximately $6.15 to $7.65 per ton. These values are incorporated in the total transfer/transportation costs summarized in Tables G-11 through G-14.

Transportation Cost Estimates

Solid waste transportation costs were developed for transport via transfer trailer and rail car. For the purpose of providing a range of transportation costs that would cover the State, points in Danbury and Putnam were selected to represent the shortest and longest distances to representative out-of-state disposal sites, all of which are in states located west and/or south of the State.

Truck/Trailer Transportation Costs

As noted above, the Transfer Station Cost Model also estimates transportation costs. The cost factors that were considered in developing the transfer costs include:

- Vehicle payload
- Driver salary;
- Vehicle service life;
- Average driving speed;

- Tractor-trailer cost;
- Licenses, taxes, insurance;
- Tractor miles per gallon;
- Vehicle warm-up;
- Load trailer;
- Unload trailer;
- Breaks and lunch; and
- Shut down and refuel.

Information was developed for long haul using a tractor- trailer as the transfer vehicle. The cost of diesel fuel is assumed to be approximately $3.00 per gallon. Sensitivity analyses revealed that transportation costs change by approximately $1.10/ton per every 100 miles for each $0.50 change in diesel fuel price.

It should be noted that the analysis presented herein represents a planning level, or "text book" approach, where it is assumed that speed limits are strictly obeyed, union-based wages are paid to drivers, drivers are limited to driving no more than 11 hours per day, and provision is included for lunch, driver breaks, proper vehicle warm-up, shut-down and refueling. Based on such assumptions, the model will develop costs which are likely to be on the higher end of the range of transfer and transportation costs. Certainly there are instances where the actual transportation costs for long haul truck transfer costs are lower because of intensive trucking industry competition, longer workdays, heavier trailer loads, and drivers' salaries, which are below union scale. In those situations where the "text book" approach is not followed, the transportation costs will be somewhat lower than costs estimated under these "textbook" assumptions.

Total Truck Transfer/Transportation Cost Estimates

Presented in Tables G-11 and G-12 are summaries of the cost per ton in 2005 dollars for the total cost of transferring and transporting MSW via truck/trailer from the western (Danbury area) and northeastern parts (Putnam area) of Connecticut to selected out-of-state landfills. As illustrated, the lowest costs are to the four eastern Pennsylvania landfills, with total transfer/transportation cost associated with their use at approximately $27 and $44 per ton respectively from the western and northeastern areas of the State, respectively. Transportation costs to these same destinations from municipalities located between Danbury and Putnam would fall in between these benchmarks.

The estimated cost of transfer and transportation of bulky wastes from western and northeastern Connecticut to out-of-state landfills in New York, Pennsylvania and Ohio are summarized in Tables G-13 and G-14. As illustrated, the lowest cost truck/trailer transfer is associated with use of the Keystone Landfill in Pennsylvania with total transfer/transportation costs of $27 and $44 per ton from the western and northeastern

areas of the State respectively. Transportation costs to these same destinations from municipalities located between Danbury and Putnam would fall in between these benchmarks. The total transfer and transportation costs shown in Table G-11, G-12, G-13, and G-14 include transfer and hauling costs, but do not include other fees.

Table G-11
Estimated Cost to Transfer MSW from Danbury to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Transfer Cost	Haul Cost ($/Ton)	Total Transfer and Transportation Cost ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	296	$6.15- $7.65	$42.14	$48.29 - $49.79
	High Acres – Fairport	326	$6.15- $7.65	$44.62	$50.77 - $52.27
	Ontario County - Stanley	310	$6.15- $7.65	$43.30	$49.45 - $50.95
	Monroe County - Riga	353	$6.15- $7.65	$47.62	$53.77 - $ 55.27
	Hyland - Angelica	328	$6.15- $7.65	$44.79	$50.94 - $52.44
Ohio					
	BFI Carbon Limestone-Mahoning Co.	448	$6.15- $7.65	$58.64	$64.79 - $66.29
	American Landfill – Stark County	498	$6.15- $7.65	$64.45	$70.60 - $72.10
	Countrywide Landfill – Stark County	513	$6.15- $7.65	$66.19	$72.34 - $73.84
	BFI of Ohio – Lorain County - Oberlin	528	$6.15- $7.65	$67.95	$74.10 - $75.60
	Suburban – Perry County - Glenford	567	$6.15- $7.65	$72.46	$78.61 - $80.11
Pennsylvania					
	Alliance Sanitary –Lackawanna Co.	140	$6.15- $7.65	$20.68	$26.83 - $28.33
	Grand Central – Pen Argyl	134	$6.15- $7.65	$20.18	$26.33 - $27.83
	Keystone – Dunmore	133	$6.15- $7.65	$20.10	$26.25 - $27.75
	GROWS – Morrisville Bucks Co.	133	$6.15- $7.65	$20.10	$26.25 - $27.75
	BFI Conestoga – Morgantown	198	$6.15- $7.65	$34.06	$40.21 - $41.71
Virginia					
	Atlantic Waste Disposal – Sussex Co.	455	$6.15- $7.65	$59.46	$65.61 - $67.11
	King and Queen – Little Plymouth	401	$6.15- $7.65	$53.18	$59.33 - $60.83
	King George – King George	340	$6.15- $7.65	$46.11	$52.26 - $53.76
	Middle Peninsula – Glenns	404	$6.15- $7.65	$53.53	$59.68 - $61.18
	Shoosmith – Chester	422	$6.15- $7.65	$55.62	$61.77- $63.27

Table G-12
Estimated Costs to Transfer MSW from Putnam to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Transfer Cost	Haul Cost ($/Ton)	Total Transfer and Transportation Cost ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	317	$6.15-$7.65	$43.87	$50.02-$51.52
	High Acres – Fairport	347	$6.15-$7.65	$46.91	$53.06-$54.56
	Ontario County - Stanley	331	$6.15-$7.65	$45.05	$51.20-$52.70
	Monroe County - Riga	374	$6.15-$7.65	$50.05	$56.20-$57.70
	Hyland - Angelica	405	$6.15-$7.65	$53.64	$59.79-$61.29
Ohio					
	BFI Carbon Limestone-Mahoning Co.	548	$6.15-$7.65	$70.25	$76.40-$77.90
	American Landfill – Stark County	599	$6.15-$7.65	$76.18	$82.33-$83.83
	Countrywide Landfill – Stark County	613	$6.15-$7.65	$77.80	$83.95-$85.45
	BFI of Ohio – Lorain County - Oberlin	629	$6.15-$7.65	$79.67	$85.82-$87.32
	Suburban – Perry County - Glenford	678	$6.15-$7.65	$84.76	$90.91-$92.41
Pennsylvania					
	Alliance Sanitary –Lackawanna Co.	240	$6.15-$7.65	$37.52	$43.67-$45.17
	Grand Central – Pen Argyl	246	$6.15-$7.65	$38.01	$44.16-$45.66
	Keystone – Dunmore	234	$6.15-$7.65	$37.02	$43.17-$44.67
	GROWS – Morrisville Bucks Co.	237	$6.15-$7.65	$37.27	$43.42-$44.92
	BFI Conestoga – Morgantown	302	$6.15-$7.65	$42.63	$48.78-$50.28
Virginia					
	Atlantic Waste Disposal – Sussex Co.	559	$6.15-$7.65	$71.53	$77.68-$79.18
	King and Queen – Little Plymouth	506	$6.15-$7.65	$65.38	$71.53-$73.03
	King George – King George	444	$6.15-$7.65	$58.18	$64.33-$65.83
	Middle Peninsula – Glenns	508	$6.15-$7.65	$65.61	$71.76-$73.26
	Shoosmith – Chester	527	$6.15-$7.65	$67.83	$73.98-$75.48

Table G-13
Estimated Costs to Transfer Bulky Waste from Danbury to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Transfer Cost	Haul Cost ($/Ton)	Total Transfer and Transportation Cost ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	296	$6.15- $7.65	$42.13	$48.29-$49.78
	Niagara Recycling – Niagara Falls	411	$6.15- $7.65	$54.34	$60.49-$61.99
	Hyland - Angelica	328	$6.15- $7.65	$44.78	$50.93-$52.43
Ohio					
	A&L Salvage – Columbiana County	469	$6.15- $7.65	$61.08	$67.23-$68.73
	LaFarge – Lordstown	450	$6.15- $7.65	$58.88	$65.03-$66.53
	Total Waste Logistics (LAS) - Youngstown	440	$6.15- $7.65	$57.72	$63.87-$65.37
Pennsylvania					
	County Environmental – Clarion County	371	$6.15- $7.65	$49.69	$55.84-$57.34
	Keystone Sanitary LF – Dunmore	133	$6.15- $7.65	$19.83	$25.98-$27.48
	Phoenix Resources – Tioga County	248	$6.15- $7.65	$38.18	$44.33-$45.83
	Environmental Recycling – Taylor, Lackawanna Co.	140	$6.15- $7.65	$20.41	$27.19-$28.69

Table G-14
Estimated Costs to Transfer Bulky Waste from Putnam to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Transfer Cost	Haul Cost ($/Ton)	Total Transfer and Transportation Cost ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	317	$6.15- $7.65	$43.87	$50.02-$51.52
	Niagara Recycling – Niagara Falls	432	$6.15- $7.65	$56.79	$62.94-$64.44
	Hyland - Angelica	405	$6.15- $7.65	$53.65	$59.80-$61.30
Ohio					
	A&L Salvage – Columbiana County	569	$6.15- $7.65	$72.67	$78.82-$80.32
	LaFarge – Lordstown	551	$6.15- $7.65	$70.61	$76.76-$78.26
	Total Waste Logistics (LAS) - Youngstown	541	$6.15- $7.65	$69.46	$75.61-$77.11

Table G-14
Estimated Costs to Transfer Bulky Waste from Putnam to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Transfer Cost	Haul Cost ($/Ton)	Total Transfer and Transportation Cost ($/Ton)
Pennsylvania					
	County Environmental – Clarion County	472	$6.15- $7.65	$61.44	$67.59-$69.09
	Keystone Sanitary LF – Dunmore	234	$6.15- $7.65	$37.03	$43.18-$44.68
	Phoenix Resources – Tioga County	371	$6.15- $7.65	$49.70	$55.85-$57.35
	Environmental Recycling – Taylor, Lackawanna Co.	240	$6.15- $7.65	$37.52	$43.67-$45.17

Estimate of Rail Haul Costs

Rail transport of waste is being increasingly utilized as a lower cost alternative for transporting waste from Connecticut to out-of-state destinations. Typically rail transport requires specialized facilities for loading rail cars at each end of the rail line. Rail transport can be via intermodal containers that are placed on specially configured rail cars, or in direct-loaded, bulk handling rail cars such as gondola cars.

In view of the fact that the private waste management industry is utilizing and proposing significant rail haul infrastructure, it is likely to play an increasing role in waste transfer in Connecticut. In that regard the following is offered as an overview of the principal issues and considerations associated with rail haul for State and local officials to utilize in their assessment the viability and application of rail haul as a means of transporting solid waste in Connecticut.

Rail car and Intermodal Container Service offer certain specific cost and efficiency advantages. In general, the greater the distance, the more economical rail transport tends to become versus over-the-road trucking and the higher the profit margin for railroads. Relatively low-margin waste operations, particularly for short-haul, does not normally make rail transport of waste attractive vis-à-vis other rail traffic commodities. Intermodal waste transfer facilities allow "consolidation" of waste from a broad area, facilitating greater densities per unit and origin location(s). The greater tonnage per container, the greater the density, and the lower the transportation costs per ton and per ton-mile. Also, the increasing cost of diesel fuel favors rail intermodal or rail car over trucking and there is a nationwide shortage of truck drivers.

On the other hand, the growth of international and domestic intermodal freight traffic is causing capacity shortages at many existing railroad intermodal facilities. There is tremendous growth in international import container freight demand which is impacting availability of intermodal facility capacity, railroad capacity and availability of intermodal rail cars. In developing rail transfer facilities, the site "footprint" must

be linear in nature to accommodate facility ramp tracks. Site must be adjacent and preferably parallel to main line rail for service access. Sufficient site or railroad right-of-way ("ROW") must be available to accommodate construction of rail car staging and storage capacity and train makeup/breakup capacity without negatively affecting main line operations. Railroads normally want a minimum of 2 to 3 times ramp track footage for staging and storage footage. Railroads normally want to be able to arrive or depart a full train in the "clear" of the main line(s) to avoid interference with other operations. Provisions needed to support rail operations include yard air (compressed air for testing cars) and car repair capability.

There is a set of priorities for rail operations. Passenger operations, particularly on Amtrak's northeast corridor have priority over freight movements. Most freight will have a higher priority for movement over waste rail car traffic because of its higher profit margin and sensitivity of service. It is desirable to have competitive rail access (access to more than one main line service provider), although often not practical. Multiple rail access can be accomplished in a number of ways, including sites located along or between rail line(s) with multiple rail service providers, site located along rail line with owner having already granted trackage/haulage rights to tenant rail service provider, site is an area under Reciprocal Switch Agreement. The most difficult situations occur where the site is "closed" to all but the primary service provider, thereby requiring difficult "access" negotiations for additional rail service.

Rail transfer operations require specific skilled labor, including lift device operators (side pick, reach-stackers, Rubber tired gantry and rail mounted gantry), "Lockdown" personnel, railcar inspection (inbound and outbound) – contract or internal qualified personnel, railcar repair personnel, and yard container stacking/transfer operations (truck/bogie or lift device). Equipment requirements include container lifting devices, containers, yard tractors/bogies, and rail cars.

A conceptual rail-haul system was used to develop an estimate of the capital and operating costs for transporting solid waste to out-of-state landfills by rail. For planning- level purposes, it was assumed that transfer (not including transportation) costs would be similar to those estimated for transfer in conjunction with truck transport; approximately $5 to $7 per ton.

Various out-of-state disposal sites have available disposal capacity to receive waste shipped by rail from the State of Connecticut. Some additional sites might not currently receive waste by rail, but could arrange for suitable rail sidings at the receiving end. These disposal sites include some of the landfills listed below in Ohio, Pennsylvania, and Virginia as well as one in South Carolina. Potential disposal sites for use in conjunction with rail haul include:

- Ohio - Carbon-Limestone and L.A.S. Landfills, both have rail access;
- Pennsylvania - various landfills in Pittsburgh area; No known rail delivery at present;
- South Carolina - Lee County Landfill (Bishopville). Waste delivered from Massachusetts (Boston and Springfield) and New Jersey;

- Virginia:
  - Maplewood Landfill. Direct rail served facility;
  - Brunswick Landfill. Existing program of rail delivered waste. Shuttle to landfill from nearby rail siding;
  - Charles City County Landfill Formerly had rail delivered waste. Shuttle to landfill from nearby rail siding; and
  - King George County Landfill. Existing program of rail delivered waste. Direct rail served facility.

The estimated range of costs to ship waste via rail from Connecticut to landfills in New York, Virginia, South Carolina, Ohio, and western Pennsylvania is presented in Table G-15.

Table G-15
Estimated Range of Rail-Haul Costs to Out-of-State Landfills from Connecticut

Landfill Location	Estimated Range of MSW Costs ($ per Ton)(1)			
	Transfer	Rail Haul (2)	Tipping Fee	Total System
Virginia	$5.00-$7.00	$44.00-$48.00	$22.00-$25.00	$71.00-$80.00
South Carolina	$5.00-$7.00	$53.00-$57.00	$20.00-$25.00	$78.00-$89.00
Ohio	$5.00-$7.00	$47.00-$51.00	$25.00-$30.00(1)	$77.00-$88.00(1)
Western Pennsylvania	$5.00-$7.00	$45.00-$49.00	$25.00-$30.00	$75.00-$86.00
New York, Rochester Area	$5.00-$7.00	$35.00-$39.00	$28.00-$30.00	$68.00-$76.00

(1) Tipping fee for bulky waste estimated to be $10-$15 per ton and total system $62-$73 per ton.

(2) Rail routing to all landfills would initially be north on a short line railroad to a Class 1 railroad, then west to Selkirk, New York. From the Selkirk rail yard waste destined for Virginia and South Carolina would be routed south, to Ohio the railcars would be routed south to Newark, New Jersey, then west through Pittsburgh, and to western Pennsylvania the railcars would follow the same route as to Ohio, except the cars would stop in the Pittsburgh area, and to New York State west to the Rochester area.

The estimates of freight rates, railcar routing, and cycle times were based on a recent rail haul analysis performed for R.W. Beck. The receipt of actual quotes from rail companies are a better indicator of these cost factors. Quotes from rail companies may be able to be negotiated to yield better rates for a shipper than the rates utilized in this analysis. Shippers that generate a large volume of car shipments may be in a position to negotiate better terms with the railroads. The analysis assumes that 100 percent of the waste currently delivered to the transfer station will be shipped by rail.

It should be noted that it might be possible to negotiate a reduction in the freight rate of 10 to 20 percent for the larger volumes of waste. This assumes that the communities and/or private haulers could commit waste quantities at the level currently being delivered to the waste-to-energy facility servicing that area.

Freight rates are dependent primarily on the distance traveled and the allowed weight per car. The number of railroads involved in a move, both Class 1 and short-line companies, also affects rates. In addition, the portion of a move on branch lines can affect the rate but more importantly the cycle time. Branch line traffic tends to move at a slower speed due to a combination of reasons including other deliveries on the line, availability of engines and crews, track condition, and/or track time competition with commuter lines.

Total Estimated Cost of Out-of-State Disposal Options

Estimates of transfer and transportation, tipping fee, and total system costs associated with use of each MSW and bulky waste disposal facility investigated are summarized in Tables G-16 through G-19. As indicated in Table G-16, the lowest cost out-of-state disposal alternatives for MSW transferred by truck from municipalities in western Connecticut are landfills in eastern and central Pennsylvania, with total costs ranging from approximately $56 to $63 per ton. As shown in Table G-17, the lowest cost out-of-state disposal alternatives for MSW transferred by truck from municipalities in northeastern Connecticut are landfills in eastern and central Pennsylvania with total costs ranging from approximately $73 to $80 per ton. As indicated in Table G-15, rail haul to western New York or Virginia would appear to be economically feasible option to consider in the future.

For disposal of bulky wastes, the lowest total system cost for rail haul is estimated to be in the range of $62 to $73 per ton for disposal at C&D landfills in Ohio. Truck transport of bulky waste from western Connecticut to Pennsylvania landfills is competitive. As indicated in Table G-18, the lowest cost out-of-state disposal alternatives for bulky waste transferred by truck from western Connecticut are landfills in eastern Pennsylvania with total costs ranging from approximately $56 to $63 per ton. As shown in Table G-19, the lowest cost out-of-state disposal alternatives for bulky waste transferred by truck from municipalities in northeastern Connecticut are landfills in eastern Pennsylvania with total costs ranging from approximately $73 to $80 per ton.

Table G-16
Estimated Total System Costs to Dispose of MSW from Danbury Area
at Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Total Transfer and Transportation Cost ($/ton)	Estimated Range of Tipping Fees ($/ton)	Total System Costs ($/ton)
New York					
	Seneca Meadows – Seneca Falls	296	$48.29 - $49.79	$28.00-$30.00	$76.29-$79.79
	High Acres – Fairport	326	$50.77 - $52.27	$28.00-$30.00	$78.77-$82.27
	Ontario County - Stanley	310	$49.45 - $50.95	$28.00-$30.00	$77.45-$80.95
	Monroe County - Riga	353	$53.77 - $ 55.27	$28.00-$30.00	$81.77-$85.27
	Hyland - Angelica	328	$50.94 - $52.44	$28.00-$30.00	$78.94-$82.44
Ohio					
	BFI Carbon Limestone-Mahoning Co.	448	$64.79 - $66.29	$25.00-$30.00	$89.79-$96.29
	American Landfill – Stark County	498	$70.60 - $72.10	$25.00-$30.00	$95.60-$102.10
	Countrywide Landfill – Stark County	513	$72.34 - $73.84	$25.00-$30.00	$97.34-$103.84
	BFI of Ohio – Lorain County - Oberlin	528	$74.10 - $75.60	$25.00-$30.00	$99.19-$105.60
	Suburban – Perry County - Glenford	567	$78.61 - $80.11	$25.00-$30.00	$103.61-$110.11
Pennsylvania					
	Alliance Sanitary –Lackawanna Co.	140	$26.83 - $28.33	$30.00-$35.00	$56.83-$63.33
	Grand Central – Pen Argyl	134	$26.33 - $27.83	$30.00-$35.00	$56.33-$62.83
	Keystone – Dunmore	133	$26.25 - $27.75	$30.00-$35.00	$56.25-$62.75
	GROWS – Morrisville Bucks Co.	133	$26.25 - $27.75	$30.00-$35.00	$56.25-$62.75
	BFI Conestoga – Morgantown	198	$40.21 - $41.71	$30.00-$35.00	$70.21-$76.71
Virginia					
	Atlantic Waste Disposal – Sussex Co.	455	$65.61 - $67.11	$22.00-$25.00	$87.61-$92.11
	King and Queen – Little Plymouth	401	$59.33 - $60.83	$22.00-$25.00	$81.33-$85.83
	King George – King George	340	$52.26 - $53.76	$22.00-$25.00	$74.26-$78.76
	Middle Peninsula – Glenns	404	$59.68 - $61.18	$22.00-$25.00	$81.68-$86.18
	Shoosmith – Chester	422	$61.77- $63.27	$22.00-$25.00	$83.77-$88.27

Table G-17
Estimated Total System Costs to Dispose of MSW from Putnam Area at Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Total Transfer and Transportation Cost ($/ton)	Estimated Range of Tipping Fees ($/ton)	Total System Costs ($/ton)
New York					
	Seneca Meadows – Seneca Falls	317	$50.02-$51.52	$28.00-$30.00	$78.02-$81.52
	High Acres – Fairport	347	$53.06-$54.56	$28.00-$30.00	$81.06-$84.56
	Ontario County - Stanley	331	$51.20-$52.70	$28.00-$30.00	$81.20-$82.70
	Monroe County - Riga	374	$56.20-$57.70	$28.00-$30.00	$84.20-$87.70
	Hyland - Angelica	405	$59.79-$61.29	$28.00-$30.00	$87.79-$91.29
Ohio					
	BFI Carbon Limestone-Mahoning Co.	548	$76.40-$77.90	$25.00-$30.00	$107.90
	American Landfill – Stark County	599	$82.33-$83.83	$25.00-$30.00	$97.33
	Countrywide Landfill – Stark County	63	$83.95-$85.45	$25.00-$30.00	$115.45
	BFI of Ohio – Lorain County - Oberlin	629	$85.82-$87.32	$25.00-$30.00	$117.32
	Suburban – Perry County - Glenford	678	$90.91-$92.41	$25.00-$30.00	$122.41
Pennsylvania					
	Alliance Sanitary –Lackawanna Co.	240	$43.67-$45.17	$30.00-$35.00	$73.67-$80.17
	Grand Central – Pen Argyl	246	$44.16-$45.66	$30.00-$35.00	$74.16-$81.66
	Keystone – Dunmore	234	$43.17-$44.67	$30.00-$35.00	$73.17-$79.67
	GROWS – Morrisville Bucks Co.	237	$43.42-$44.92	$30.00-$35.00	$73.42-$79.92
	BFI Conestoga – Morgantown	302	$48.78-$50.28	$30.00-$35.00	$78.78-$85.28
Virginia					
	Atlantic Waste Disposal – Sussex Co.	559	$77.68-$79.18	$22.00-$25.00	$99.68-$104.18
	King and Queen – Little Plymouth	506	$71.53-$73.03	$22.00-$25.00	$93.53-$98.03
	King George – King George	444	$64.33-$65.83	$22.00-$25.00	$86.33-$90.83
	Middle Peninsula – Glenns	508	$71.76-$73.26	$22.00-$25.00	$93.76-$98.26
	Shoosmith – Chester	527	$73.98-$75.48	$22.00-$25.00	$95.98-$100.48

Table G-18
Estimated Total System Cost to Dispose of Bulky Waste from
Danbury Area to Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Total Transfer and Transportation Cost ($/Ton)	Estimated Range of Tipping Fees ($/Ton)	Total System Costs ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	296	$48.28 - $49.78	$28.00 - $30.00	$76.28 - $79.78
	Niagara Recycling-Niagara Falls	411	$60.49 - $61.99	$28.00 - $30.00	$88.93 - $91.99
	Hyland - Angelica	328	$50.93 - $52.43	$28.00 - $30.00	$78.93 - $82.43
Ohio					
	A&L Salvage-, Columbiana Co.	469	$67.23 - $68.73	$10.00 - $15.00	$77.23 - $83.73
	LaFarge-Lordstown	450	$65.03 - $66.53	$10.00 - $15.00	$75.03 - $81.53
	Total Waste Logistics (LAS)-Youngstown	440	$63.87 - $65.37	$10.00 - $15.00	$73.87 - $80.37
Pennsylvania					
	County Environmental-Clarion Co	371	$55.84 - $57.34	$20.00 - $25.00	$75.84 - $82.34
	Keystone Sanitary LF– Dunmore	133	$25.98 - $27.48	$30.00 - $35.00	$55.98 - $62.48
	Phoenix Resources-Tioga Co.	248	$44.33 - $45.83	$25.00 - $30.00	$69.33 - $75.83
	Environmental Recycling-Taylor, Lackawanna Co.	140	$27.19 - $28.69	$30.00 - $35.00	$57.19 - $63.69

Table G-19
Estimated Total System Costs to Dispose of Bulky Waste from
Putnam Area at Selected Out-of-State Landfills

State	Facility	Hauling Distance (One-Way Miles)	Total Transfer and Transportation Cost ($/Ton)	Estimated Range of Tipping Fees ($/Ton)	Total System Costs ($/Ton)
New York					
	Seneca Meadows – Seneca Falls	317	$50.02-$51.52	$28.00 - $30.00	$78.02-$81.82
	Niagara Recycling-Niagara Falls	432	$62.94-$64.44	$28.00 - $30.00	$90.94-$94.44
	Hyland – Angelica	405	$59.80-$61.30	$28.00 - $30.00	$87.80-$91.30
Ohio					
	A&L Salvage-, Columbiana Co.	469	$78.82-$80.32	$10.00 - $15.00	$88.82-$95.32
	LaFarge-Lordstown	450	$76.76-$78.26	$10.00 - $15.00	$86.76-$93.26
	Total Waste Logistics (LAS)-Youngstown	440	$75.61-$77.11	$10.00 - $15.00	$85.61-$92.11
Pennsylvania					
	County Environmental-Clarion Co	371	$67.59-$69.09	$20.00 - $25.00	$87.59-$94.09
	Keystone Sanitary LF– Dunmore	133	$43.18-$44.68	$30.00 - $35.00	$73.18-$76.68
	Phoenix Resources-Tioga Co.	248	$55.85-$57.35	$25.00 - $30.00	$80.85-$87.35
	Environmental Recycling-Taylor, Lackawanna Co.	140	$43.67-$45.17	$30.00 - $35.00	$73.67-$80.17

Comparison of In-State vs. Out-of-State Disposal Costs

Background

Valid comparison of solid waste disposal options requires taking into account each of the components of the disposal system: transfer, transportation, and disposal tipping fees. While use of in-state RRFs does not always include transfer and transportation, these essential components comprise a significant share of the total cost of out-of-state disposal options.

Transfer Costs

Transfer costs comprise a relatively small share of the total cost of either in- or out-of-State disposal. Costs are largely fixed, with the incremental cost of each additional ton handled being relatively small. Thus, transfer costs per ton decrease significantly as the number of tons handled increases.

Transportation Costs

As revealed in the cost analysis of out-of-state disposal options, transportation costs comprise the majority of costs of total system costs, with a large share of the costs attributed to driver labor costs and fuel costs. Thus, increases in transportation costs closely correlate with the increase in distance between the point of transfer and the disposal destination selected.

Disposal Tipping Fees

Tipping fees are assessed for use of disposal capacity. Development of solid waste landfill and resource recovery facility ("RRF") capacity is capital intensive. Fixed costs are high relative to incremental operating costs for both options. Owners seek to maximize utilization of the fixed asset and offer a menu of tipping fees including contract and spot market prices to do so. However, since RRF capacity is production-rate related; i.e. there is a finite number of tons (based on the Btu value of the waste) that can be processed per hour, RRFs typically have to be more aggressive and offer longer term contracts to ensure that capacity is utilized on a consistent basis.

Solid waste disposal capacity is a commodity. As such, the price of capacity is driven by supply and demand. As supply increases relative to demand, the price will drop, and to the contrary, prices will rise when demand grows faster than supply. In other words, beyond covering incremental costs, to a certain extent tipping fees become based on what disposal facilities are able to charge, rather than what they must charge to make a reasonable return on investment.

As a result of being highly correlated with the supply/demand ratio, tipping fees charged by both landfill and RRFs are based on what the market will bear. This is known as the market- based tipping fee. From the standpoint of any given disposal facility, the market based tipping fee that can be charged will typically decrease based on the number and type of competing disposal options to a waste supplier, and with the distance of the supplier from the facility, since the total "disposal cost" to the waste supplier will include transfer and transportation costs.

The market-based tipping fee for a given waste shed can be established though an assessment of alternatives available to a potential waste supplier, e.g. a Connecticut municipality, and identification of the lowest cost alternative. If there are no options within a short driving distance of the waste supplier, the market-based tipping fee will be higher than the norm. This is the case in Connecticut, as documented by the analysis of costs associated with disposal options presented earlier in this analysis.

Comparison of Current Total Disposal System Option Costs

MSW Disposal

At the present time, the majority of the communities in the State pay tipping fees for disposal at RRFs in the range of $57 to $70 per ton. In some cases the tipping fee includes the cost of non-disposal related services such as recycling education and HHW collection programs. While some deliver MSW directly, others incur transfer and transportation costs that, where necessary, may add from $5 to $15 per ton. Thus, it is believed that, even including those communities that do not contract with any of the six RRFs, the total MSW disposal system cost falls in the broad range of $57 to $85 per ton, with the majority of total system costs estimated to be in the range of $65 to $75 per ton.

The cost analysis of out-of-state disposal alternatives revealed MSW disposal options available in Pennsylvania with total system costs in the broad range of $56 to $80 per ton depending largely on the distance the Connecticut municipality is from Pennsylvania. The total system cost for most municipalities in the central and western regions of the State would fall between $65 and $70 per ton. Thus, it appears that the $65 to $70 per ton range is the market-based price of disposal options available to Connecticut communities. Given that the RRFs in Connecticut will be free of their bond debt in upcoming years, it is expected that the facilities, with the exception of Wallingford, will be able to operate more cost-effectively, if no additional bonds are issued.

Bulky Waste Disposal

The tipping fees charged by the two major in-state landfills receiving bulky wastes are currently $60 to $65 per ton. Gate rates at VRFs range from $65 to $90, but since integrated waste hauling/processing companies have developed much of the VRF capacity for internal use, the actual cost to these firms is less than tipping fees at the two major landfills. Total system costs, including transportation costs, vary widely, largely dependent upon the distance from the municipality to these landfills.

For disposal of bulky wastes outside of the State, the lowest total system cost for rail haul is estimated to be in the range of $62 to $73 per ton for disposal at C&D landfills in Ohio. Truck transport of bulky waste from western Connecticut to Pennsylvania landfills is competitive. As indicated in Table G-19, the lowest cost out-of-state disposal alternatives for bulky waste transferred by truck from western Connecticut are landfills in eastern Pennsylvania with total costs ranging from approximately $56 to $63 per ton. As shown in Table G-19, the lowest cost out-of-state disposal alternatives for bulky waste transferred by truck from municipalities in northeastern Connecticut are landfills in eastern Pennsylvania with total costs ranging from approximately $73 to $80 per ton.

Projected Future Disposal System Costs

The market-based price serves as a benchmark which in-state RRFs presently have been able to meet, and will have to continue to meet, in the future. In view of the fact that "the market" establishes disposal capacity tipping fees, the future tipping fees that in-state RRFs will be able to charge will be determined by the costs of the competing out-of-state alternatives, which in turn will be largely determined by the balance of the supply of disposal capacity and the demand for capacity. Thus, the best way to project future RRF tipping fees is to assess the drivers that will have the most impact on out-of-state disposal facility cost factors and the supply/demand ratio.

Over the past 10 to 15 years the private waste management industry has invested in and created additional capacity, increasing the total from 5.3 million tons in 2000 to 6.6 million tons in 2005. This increase in supply relative to demand has resulted in "oversupply" and has placed downward pressure on prices despite the increase in demand (tons of waste generated) over the same period. As a result, the national average "gate rate" has increased at a slower rate than inflation, increasing from $29 per ton in 1992 to only $35 per ton in 2004.

Solid waste suppliers, including Connecticut communities, are interested in having some sense of what the future tipping fees might be relative to today. Barring some unforeseen economic downturn, it would appear that the growth in demand for disposal capacity would exceed the growth in supply. Thus, tipping fees at out-of-state landfills will more likely than not increase at a rate above inflation.

Drivers that would tend to increase the demand for capacity faster than the increase in supply include the following:

- Consumer spending on consumer goods and housing, with the attendant generation of waste continues to increase;
- Diversion of materials is unlikely to increase at the same rate as over the past ten years as residential and commercial recycling program implementation and growth (on a regional basis) has leveled off;
- Land values are increasing more rapidly than inflation and would comprise a larger portion of the cost of landfill capacity even if it could be purchased and developed;
- Statewide moratoriums on development of landfill capacity are increasing;
- Public pressure for increased State and federal enforcement of environmental regulations relating to protection of air and water quality will make siting and operation more difficult and more costly; e.g. C&D landfills in the State of Ohio; and
- The pressures of residential and commercial land development will result in less availability of land suitable for meeting the multiple tests of political and social acceptance, and environmental, health, safety, and economic suitability required for disposal facilities.

There are also reasons beyond changes in the supply/demand curve that could arbitrarily increase out-of-state tipping fees. Government intervention can impact tipping fees by actions that artificially reduce supply or cost competitiveness. Daily capacity limits imposed by State regulatory agencies in the facility construction and operations permitting process are an example of the former. State surcharges imposed on a per-ton basis, as in Pennsylvania and more recently in Ohio, are an example of the latter.

Although revenues from electricity typically may account for as much as 50 percent of the revenue for a resource recovery facility ("RRF"), changes in the retail electricity price are generally not reflected in the tipping fee. This is because competitive market forces generally determine tipping fees. However, the projected retail price for electricity is worth noting. As a part of its analysis of the "Clear Skies" initiative, the United State Environmental Protection Agency ("U.S. EPA") has projected retail electricity prices for NERC's Northeast Power Coordinating Council ("NPCC") region, which includes the State of Connecticut. The U.S. EPA projects that retail electricity prices in the NPCC will increase from approximately $0.070 per kilowatt hour in 2005 to $0.085 per kilowatt hour in 2020.

On a cautionary note however, the option to ship waste out-of-state may be questioned for at least two reasons. First, the issue of the long-term reliability of out-of-state disposal especially with regard to changed circumstances of private operators (for example, financial insolvency) or changes in State-level regulation could make this option less available. A good example of this is the increasing pressure being placed on State officials in Ohio to increase regulation of C&D landfills. Growing interstate conflicts, which often become protracted battles in the federal courts, have emerged in recent decades as states allege that they are recipients of unwanted imports. Nowhere is the problem of interstate transfer more evident than in the disposal of solid, hazardous and nuclear wastes. Out-of-state waste export has been an increasingly common pattern, with wastes often shipped to facilities opened before concern over waste and facility siting became widespread. In the long term, waste may ultimately be deposited in the least resistant State or facility at any given time in the future.

Second, the question to consider is whether as a matter of environmental responsibility, Connecticut should manage its own waste when the resources could be made available in-state to deal with the problem. Both these considerations may lead the State to conclude that Connecticut should continue to develop in-state RRF capacity necessary to meet future demand. To achieve compliance with the guiding principal of cost effective will require a balance between short-term cost and long-term security.

This cost analysis of in-state versus out-of-state disposal options and the accompanying comparison of the environmental impacts (see Appendix I) of both reveal that both have advantages and disadvantages. The advantages and disadvantages of expansion of in-state RRF disposal capacity can be summarized as follows:

- Advantages
  - Maintenance of disposal option results in lower market-based tipping fee available to municipalities over the long term;
  - Preserves the opportunity for each municipality to evaluate and choose based upon what is in their own best interest;
  - Less impact on State air quality since truck and rail transportation required for out of State options are significantly reduced;
  - Less truck/trailer traffic and wear and tear on State highways;
  - Closer compliance with the State solid waste management hierarchy;
  - Creation of more local jobs;
  - Increases capability to implement economic incentives to reduce waste generation;
  - Easier to manage political, regulatory, and economic risks;
  - Continuing residential and commercial development may inhibit ability to site new facilities in the future;
  - Provides more accurate and complete data to perform future capacity planning; and
  - During economic swings, excess capacity can be used to generate revenue from spot market tip fees.
- Disadvantages
  - May not be as cost effective as out-of-state disposal in the sort term;
  - More potential for negative impact with regard to emissions to the environment;
  - Disposal capacity is less flexible; requires a commitment to supplying a specific disposal tonnage to be cost-effective; and
  - Difficulty in siting new in-state facilities.

Appendix H
SPECIAL WASTE MANAGEMENT

Introduction

This Appendix identifies and assesses the current management practices and diversion opportunities for 10 waste streams identified by the CT DEP as Special Wastes because, as components of the State's solid waste stream, they pose particular management challenges.

Of these 10 types of wastes, three are of particular importance to the CT DEP.

- Used electronics, because it is a rapidly growing waste stream which includes some products that contains potentially hazardous materials;
- Commercial food waste (from institutions and businesses), because it is a major waste stream for which few diversion programs have been developed; and
- Construction and demolition debris, because it is a significant portion of State's waste stream for which very little diversion has taken place in Connecticut.

These three waste streams are important opportunities for Connecticut to achieve its waste diversion goals. Therefore, each is discussed in some detail.

Other Special Wastes addressed in this Appendix in a more summary fashion include:

- Animal mortalities;
- Land clearing debris;
- Road wastes (Catch Basin Cleanings and Street Sweepings);
- Contaminated Soils;
- Dredge Materials;
- Household hazardous waste, including mercury-containing wastes; and
- Sewage Sludge.

Used Electronics

Statutes and Regulations for Used Electronics

The State of Connecticut uses the federal definition found in 40 CFR 100 (Code of Federal Regulations) for used electronics, which reads:

> Used electronics or used electronic devices -- A device or component thereof that contains one or more circuit boards or a cathode ray tube and is used primarily for data transfer or storage, communication or entertainment purposes.

Management of used electronics must comply with the Universal Waste Rule in Connecticut. The universal waste rule requirements are found in Section 22a-449(c)-113 of the Regulations of Connecticut State Agencies ("RCSA"). The Connecticut Universal Waste Rule incorporates 40 CFR 273 in its entirety except for the following provision that is not incorporated: 40 CFR 273.32(a)(3) (regarding an exemption from notification requirements for large quantity handlers of recalled universal waste pesticides).

In additional to electronics, the following waste steams are subject to the Universal Waste Rule in Connecticut:

- Batteries;
- Mercury-containing thermostats;
- Certain pesticides; and
- Lamps (including but not limited to fluorescent, neon and mercury vapor lamps).

The Universal Waste Rule provides a set of streamlined regulations to reduce the regulatory burden by allowing longer time for the storage of the wastes, reduced record-keeping requirements and consolidation off-site without a permit.

In general, a handler can store a universal waste on-site for no longer than one year from the date the universal waste is generated, or received from another handler. A small quantity handler can accumulate not more than 5,000 kilograms total of universal waste (batteries, pesticides, thermostats, lamps and used electronics collectively) at any time. A large quantity handler can accumulate 5,000 kilograms or more of universal waste (batteries, pesticides, thermostats, lamps and used electronics collectively) at any time.

Used electronics must be stored in a building with a roof and four walls or in a cargo carrying portion of a truck, in a manner to prevent used electronics from being exposed to the environment. The used electronics must be handled, stored and transported in a manner that maintains the reuse or recyclability of the used electronic. A handler must immediately clean up and contain any debris from a broken cathode ray tube and place the debris in a container that is closed, structurally sound and compatible with the CRT. It should prevent leakage, spillage or releases of broken CRTs, glass particles or other hazardous constituents from such broken tubes to the environment. A handler must not shred, crush, heat or otherwise treat used electronics. A small quantity handler may disassemble used electronics for the sole purpose of marketing, reselling, reusing or recycling components. A large quantity handler must first obtain a permit issued by the commissioner before disassembling used electronics.

Adequate aisle space must be maintained around the containers to allow unobstructed movement of personnel and emergency response equipment. A minimum of 30-inch aisle space is recommended. Handlers of universal waste must immediately contain all releases of universal wastes and other residues from universal wastes. A handler must determine whether any material resulting from the release (e.g., spilled material, residue, absorbent) is hazardous wastes, and if so, must manage that material as a

hazardous waste. The handler is considered the generator of the material resulting from the release and is treated as a hazardous waste generator.

Existing Infrastructure for Managing Used Electronics

According to the Electronics Industry of America ("EIA"), the average American discards 2.5 pounds of used electronics annually. Applying this statistic to the Connecticut population yields an annual quantity of approximately 4,354 tons of discarded used electronics. The infrastructure for recycling used electronics is comprised of special collection events, drop-off sites at certain transfer stations and landfills, and private recycling companies. The special collection events are hosted and funded by CRRA, other regional authorities, and municipalities. Authorities and municipalities typically coordinate the events, and contract with a private company to transport and recycle the materials. Collection events are generally open to residents only. Businesses typically hire a private company to remove their old electronics. In addition to the special collection events, source-separated electronics may be delivered to the transfer stations and landfills identified in Table H-1.

Table H-1
Transfer Stations and Landfills that Accept Used Electronics

Facility	County	City
Avon Transfer Station	Hartford	Avon
Branford Transfer Station	New Haven County	Branford
Granby Transfer Station	Hartford	Granby
New Milford Recycling Center	Litchfield	New Milford
Rocky Hill Transfer Station	Hartford	Rocky Hill
Suffield Landfill	Hartford	Suffield
Watertown Transfer Station	Litchfield	Watertown
Wethersfield Transfer Station	Hartford	Wethersfield
Woodstock Residential Transfer Station	Windham	Woodstock

It should be noted that the transfer stations and landfills in Connecticut that accept used electronics frequently change, thus Table H-1 should not be considered conclusive. Finally, private recyclers for used electronics are either located in or service Connecticut. Information on these facilities may be found at http://www.dep.state.ct.us/wst/recycle/elecrecy.htm. In general, municipalities do not charge residents to recycle their waste electronics.

To date, the only data pertaining to the quantity of used electronics that these outlets recover is from the special collection events. For 2003, the most recent data available, CT DEP reports that approximately 67 tons of used electronics was recycled. This

probably understates what was actually recovered because it does not include materials recovered from commercial sources.

Assessment of Current Infrastructure

A recent study by the National Recycling Coalition estimates that over 20 million personal computers became obsolete in the United States in 1998. Between 1997 and 2007 nearly 500 million personal computers will become obsolete – almost two computers for each person in the United States. Some studies predict that a large number of televisions will be disposed when high definition television becomes widely available and affordable. Many used televisions, monitors, printers, and other types of electronic equipment are finding their fate in attics, basements, and warehouses while some people still dispose of electronics curbside in the residential sector. Businesses and households keep these products because they believe that they may still be valuable, but the longer equipment remains in storage, the less useful it becomes.

While end-of-life electronics currently comprise only a small amount (1 to 2 percent by weight) of the municipal waste stream, that percentage is expected to grow dramatically in the next few years. As this waste stream increases, the cost of recycling these materials may become financially prohibitive for Connecticut municipalities and authorities, which may decrease the availability of these events. In addition, the current recycling events are already limited in terms of location and frequency in Connecticut. This has the effect of limiting participation because the events do not serve all the residents of the State, and residents may have difficulty learning about those that are held irregularly. In addition, businesses, especially small businesses that lack the staff/management support found in larger organizations, may not be aware of their obligations or opportunities in handling their end-of-life electronics.

To help address these issues, and as part of the development of this Solid Waste Management Plan, the CT DEP conducted a stakeholder forum in June 2005, with managing used electronics as a breakout session. One of the outcomes from the forum was the following vision statement for used electronics:

> "By 2010, the State of Connecticut should develop reduction/recycling programs to eliminate electronics from landfills and resource recovery facilities. The programs should involve shared responsibilities amongst producers, consumers, retailers and government."

As part of the planning process, CT DEP requested R. W. Beck to analyze the Maine legislation for managing used electronics, as well as the Northeast Recycling Council (NERC) and National Electronics Product Stewardship Initiative ("NEPSI") initiatives to determine how they address shared responsibility for used electronics.

Strategies for Managing Used Electronics

Overview of State Strategies

Table H-2 shows an overview of some of the strategies various states are taking, as shown by their legislation, to address the management of electronic wastes. The legislative efforts vary in impact, from stating that they will study effective means of managing electronic waste streams, to banning State-agency electronics from the waste stream, to charging an advance recovery fee on the sale of electronics.

Table H-2
Examples of State Legislation

State	Type Of Law	Status as of June, 2006
Arkansas	Starting January 1, 2008, State-agency generated computers, monitor's, TVs, audio and stereo equipment, VCRs, keyboards, printers, telephones and fax machines will be banned from landfill disposal.	Signed by the Governor on March 21, 2005
California	An advance recovery fee ("ARF") assessed on any device with a cathode ray tube or any flat-panel device; graduated fee system; manufacturer must submit a collection and recycling plan; Retailers can retain 3% administrative fee; fines for non-compliant retailers.	Became effective January 1, 2005
Illinois	Commissions a study into effective means for recycling e-waste.	Becomes effective June 1, 2006
Louisiana	Commissions a study into effective means for recycling e-waste and how it should be funded.	Passed House and Senate Presidents

Table H-2
Examples of State Legislation

State	Type Of Law	Status as of June, 2006
Maine	Manufacturers must submit collection, reuse, recycling plans to State.	Bill passed in 2003 and signed by Governor; took effect January 1, 2005.
	Municipalities must transport waste electronics to a consolidation site.	
	Manufacturers shall pay for the consolidation, based on market share.	
	Cost can not be separate line item, nor charged at end of product life.	
	Landfill ban on e-waste beginning January 2006.	
	All manufacturers must comply by January 2006, or may not sell products in State.	
Minnesota	Established a county-by-county collection system, with manufacturers being responsible for funding the program or creating their own plan.	Took effect July 1, 2005
Washington	Commissions a study into effective means for recycling e-waste.	Passed May 2004
	Law enacted that provides for electronic recycling through manufacturer financed opportunities.	Bill passed and Governor signs into law March 24, 2006.

Maine

Maine legislated one of the Country's more progressive models for producer responsibility of used electronics (Chapter 1610). The law requires individual municipalities to transport television monitors or displays with a circuit board and greater than four inches (targeted electronics) to consolidation facilities. The manufacturers of targeted electronics must ensure that consolidation facilities are situated so as to provide convenient access (as determined by the State), and pay reasonable operational costs of the consolidation facilities, transportation to the recycling/dismantling facilities, and the costs of recycling.

The consolidation facilities must then identify and count devices by manufacturer. These facilities must also work cooperatively "…with manufacturers to ensure implementation of a practical and feasible financing system. At a minimum, a consolidation facility shall invoice the manufacturers for handling transportation and recycling costs for which they are responsible under the provisions…"

The cost of this may not be directly passed on to the consumer as a separate line item. If the cost is incorporated into the price of the product, it must be done at the point of purchase, rather than at the end of the product's useful life.

Beginning in November 2005, the manufacturers of the targeted electronics must label all devices. Effective January 2006, no manufacturers may sell targeted electronics in Maine unless they demonstrate compliance with Chapter 1610. Also by January 2006, all targeted electronics will be banned from disposal in Maine.

NERC

Northeastern Recycling Council ("NERC") is comprised of 10 states, including Connecticut, and is currently developing a model for diverting used televisions and computer equipment from landfill disposal. Similar to the Maine approach, manufacturers must label all covered devices with how to obtain information about reuse/recycling, and pay fees to support reuse/recycling collection programs. In addition, retailers must provide information on how to reuse or recycle covered devices. The NERC strategy establishes a not-for-profit corporation designated by the State environmental agency to implement the Act. The corporation's purpose would be to:

- Develop and implement State-wide reuse and recycling programs;
- Receive and distribute fees;
- Recommend adjustments to fees; and
- Report annual progress to State legislature.

The corporation is to be governed by a multi-stakeholder board of directors, comprised of the following representatives:

- Manufactures of covered device;
- Retailers of covered devices;
- Not-for-profit recycler of covered devices;
- For-profit recycler;
- Government representatives, including one from local government; and
- Ex-officio representative of State agency's director.

The corporation must remit 3 percent of collected fees to the State agency for administrative, education, and enforcement purposes, and the corporation may not spend more than 5 percent of its collected fees on administrative expenses.

Other provisions of the NERC strategy include:

- No-charge recycling/reuse programs – No fees may be charged to consumers participating in collection programs;
- Recovery, reuse and recycling goals:
  - 100 percent reuse/recycling in 10 years;
  - State agency to establish annual goals to progress toward 100 percent; and
  - Agency authorized to implement regulations to create alternative actions to meet goals;
- Disposal Ban – Covered devices would be banned from disposal after two years from enactment;
- Defers to Federal Law – Act would sunset following implementation of national program for covered devices;
- Incentives for Green Design – Corporation shall annually publicize/announce which manufacturer or brands that:
  - Contain the least amounts of specific toxic materials;
  - Contain the highest recycled material content; and
  - Demonstrate the greatest overall improvements in these areas; manufacturers could use such status in advertisements/promotions.

NEPSI

Development of a national recovery system has been underway since 2001 by the National Electronics Product Stewardship Initiative ("NEPSI") that promotes a product stewardship approach, whereby all parties share responsibility for environmental impacts resulting from the manufacture, use, and disposal of obsolete electronics. The NEPSI collaborative proposes implementation of a sustainable financing system for a national electronics product stewardship plan, utilizing an up-front fee system or cost-internalized model, where the cost for recycling is included in the purchase price of the electronic product.

The NEPSI strategy for managing used electronics is similar to the NERC approach, in that their proposal includes a:

- Fee to fund program – possibly an Advanced Recovery Fee ("ARF"), but not yet determined;
- Third-party organization to operate/oversee system;
- Recovery/recycling goals;
- Environmentally sound management; and
- Oversight by environmental agency and legislature.

As of July, 2005, the NEPSI process finalization was on-hold a consensus on the fee/financing mechanism could be developed.

Commercial Food Waste

Statutes and Regulations

CT Statutes

Sec. 22a-207 (5) "Volume reduction plant" means any location or structure, whether located on land or water, where more than two thousand pounds per hour of solid waste generated elsewhere may be reduced in volume, including but not limited to, resources recovery facilities and other incinerators, recycling facilities, pulverizers, compactors, shredders, balers and composting facilities.

Sec. 22-207a (1) "Composting" means a process of accelerated biological decomposition of organic material under controlled conditions."

CT Regulations

Sec. 22a-208a-1. Solid Waste Permit Fee Regulations

(a) Definitions

(31) **"Source-separated organic material composting facility"** means land, including structures and appurtenances thereon, where the composting of organic material that has been separated at the point source of generation from non-organic material, takes place. For purposes of this section **"organic material"** means substances composed primarily of carbon and nitrogen, including but not limited to food scraps, food processing residue, soiled or unrecyclable paper and yard trimmings.

(b) Fees for an Application for a Permit to Construct a Solid Waste Facility.

3(B) Source-separated organic material composting facility with a capacity as designed of no more than 100 TPD: $5,000

(C) Source-separated organic material composting facility with a capacity as designed of greater than 100 TPD: $6,500

Current Food Waste Recovery in Connecticut

Currently in Connecticut, there are a few examples of composting of food waste occurring; these examples include that which is processed through the Agricultural Waste Management Plan program, a successful prison composting program, a few pilot projects and some school composting programs. Municipalities can report, in their annual recycling reports, the amount of food waste recycled. For FY 2003, municipal reports indicate that approximately 630 tons of food waste had been recovered – either composted or rendered. This reported amount is expected to understate actual food recovery.

It is also known that Mohegan Sun has been diverting food waste from its casino restaurants to a nearby piggery in Connecticut. The Mohegan Sun did not submit a

report for FY 2003 or 2004, but in FY 2002 indicated that they had recovered 2,482 tons of food waste by delivering it to the piggery.

An industrial food plant owned by Nestle also owned and operated a composting facility in New Milford, called New Milford Farms. This facility, which was permitted to receive up to 54,000 tons per year, processed industrial food residuals from the local plant (which manufactures bullions and other flavorings) as well as food residuals from Nestle plants in New York and New Jersey. Feedstocks included tea leaves and coffee grounds. The facility also accepted yard waste, clean wood waste, and pallets for processing, for a tip fee. In addition they processed washwater sludge from a food processing facility located across the street, vegetative waste from two Stop and Shop stores (one located in Danbury, the other in New Milford) and hydrolyzed plant protein that was mined from the company's on-site landfill dedicated to this material. The processing was all under cover, using windrow technology. Composted cow manure was also delivered to the facility, and top soil, potting soil, and manure blends were developed to a third-party marketing company's specifications. New Milford Farms, in its best year, produced 944,000 40-pound bags of product (19,880 tons). The facility has ceased operating.

CT DEP Food Waste Program Development Activities

Food Mapping Study

The CT DEP contracted with a private firm conduct a food waste mapping study in 2001. At that time, it was estimated that there were over 1,300 potential sources for significant amounts of food waste in the State. These generator types included the following categories, and considered only those that met certain size thresholds:

- Food manufacturers/processors;
- Food wholesalers/distributors;
- Health care facilities;
- Colleges/universities;
- Private schools;
- Correctional facilities;
- Resorts/conference facilities;
- Supermarkets; and
- Major private employers.

The study indicated that between 99,946 and 153,331 tons of source-separated organics could be collected from these generators as feedstock for composting. The study further concluded that there are enough generators of organics in Connecticut to warrant pursing an organics composting program including food waste.

Pilot Programs

CT DEP also funded the publication of a manual to instruct schools (K-12) how to develop an on-site food residuals composting program. This manual was based on the experience of Mansfield Middle School, which developed a pilot composting program in 2000. The school of 650 was able to compost 4,168 pounds of food scraps, along with three to four cubic yards of leaf waste and wood chips, to produce 1.5 cubic yards of compost in their first year. During the second year they were averaging 37 to 49 pounds per day of food waste (including both kitchen scraps and plate scrapings). CT DEP does not monitor the number of such programs in existence, or the volume of food waste being source reduced in this manner.

Assessment of Connecticut's Food Waste Processing Infrastructure

Currently there is no infrastructure in place to process food waste. However, the existing trash hauling industry is capable of providing collection services. If food waste processing can be established, whereby the processor can charge a tip fee that is significantly lower than tip fees for MSW disposal, which is plausible, then large generators of source-separated organic materials would have an economic incentive to separate this material, and seek an alternative to disposal. This may, however, require more than simply development of a processing facility. As described below, education is an important part of developing a successful food waste recovery program.

Other States' Strategies for Encouraging Food Waste Recovery

Massachusetts

The Commonwealth of Massachusetts began an initiative to target food waste in the early 1990's. The Commonwealth formed an organics subcommittee to focus on developing significant infrastructure to compost food waste in Massachusetts. Relatively high tipping fees, particularly in the eastern portion of the State, have also helped facilitate the development of this infrastructure. MA DEP also is considering a disposal ban on food waste, if infrastructure is in place by 2010. Another driver that helped initiate interest in food waste composting was the fact that MA DEP indicated that in-sink disposal systems might be disallowed at sites that generate large quantities of food waste. MA DEP also provided the following types of support for their Supermarket Organics Recycling Network ("SORN"):

- Developed a food density mapping study (similar to the one conducted in Connecticut) which is used to provide technical assistance to haulers, in terms of developing efficient routes;

- Provided financial assistance to organics generators, processors, and haulers through its Recycling Industries Reimbursement Credit grant and Recycling Loan Fund programs;
- Provided hands-on technical assistance to generators – physically going to sites of large-scale generators and showing them how to effectively capture food waste, considering the flow of their business;
- Worked with State procurement agencies to create State agency demand for compost;
- Partnered with the Massachusetts Food Association, a supermarket industry group. Recently the MA DEP and MFA signed a memorandum of understanding to encourage grocery stores across Massachusetts to increase their recycling participation – especially in terms of composting spoiled fruits and vegetables, deli wastes, and waxed cardboard. By working together, a program that makes sense for industry was created.

In 2004, 57 grocery stores participated in the program. The supermarkets were able to divert (between composting and recycling packaging) 60 to 75 percent of their waste, diverting 8,900 tons of organics, 26,200 tons of cardboard, and more than 1,000 tons of plastic from disposal. This resulted in a cost savings, on average, of more than $45,000 per year per store. Currently, 62 stores participate in the program, and the hope is that at least 100 stores will be participating in the program by 2006. Ultimately, MA DEP hope to have 400 supermarkets actively recycling in three years. The U.S. EPA is looking at the Massachusetts program, and hopes to replicate it nationwide.

Pennsylvania

In Pennsylvania, the PA DEP also formed an organics task force to determine how best to promote organics recycling in that state. The task force included a variety of members, including municipal members, regulatory, and commercial/industrial members. They used a consensus process to develop recommendations to the PA DEP. The task force submitted their recommendations in August 2002. PA DEP was asked to examine and make strides in the following broad categories:

- Economics and marketing;
- Education and training;
- Legislation and regulation; and
- Coordination and strategy.

Many recommendations were put into action, and today PA DEP's composting programs are growing. PA DEP provides technical assistance opportunities, through a program with the Solid Waste Association of North America ("SWANA"), to food waste generators interested in composting food waste. They also have a grant program that provides 90 percent of funds to public entities for recycling infrastructure. In 2005, the State began offering Composting Infrastructure Development Grants for public and private entities needing capital to secure

composting equipment. There is a $75,000 maximum per project, and the applicant must pay for 20 percent of the cost of the equipment. The City of Philadelphia received an Act 198 Resource Recovery Demonstration Grant for in-vessel composting of pre- and post-organic food waste in an urban setting.

PA DEP also:

- Works with Professional Recyclers of Pennsylvania ("PROP") in order to develop workshops and courses on composting and marketing compost;
- Developed food processing manual's Best Management Practices – e.g., no permit is required to process food processing residuals on site, if guide is followed;
- Developed a general permit for food-waste composting facilities receiving source-separated food waste up to five acres in size; and
- Developed an on-farm food waste composting general permit.

This has resulted in several programs with universities, prisons, and farmers, sometimes working collaboratively, to compost food waste. Also, there are several private operators that include food waste in their composting operations. Development of a composting facility can occur relatively quickly – generally within a matter of 30 days for a general permit, and a few months for an individual permit. No public hearing is required, unless the PA DEP determines that it is warranted. The PA DEP is planning to develop a general permit that will allow municipal yardwaste sites to accept post-consumer food for processing. PA DEP is also involved in market development for compost. They recently conducted an erosion and sedimentation control and stormwater design class with PROP.

Construction Waste and Demolition Debris

Statutes and Regulations

In Connecticut, construction waste and demolition debris ("C&D waste") are regulated as two distinct waste streams.

Construction waste is a component of the MSW waste stream in Connecticut. Section 22a-207 of the Connecticut General Statutes ("CGS") defines MSW as solid waste from residential, commercial and industrial sources, excluding solid waste consisting of significant quantities of hazardous waste as defined in CGS 22a-115, land-clearing debris, demolition debris, biomedical waste, sewage sludge and scrap metal. Due to construction waste being included in the statutory definition of MSW, this waste stream is required to be disposed in an MSW solid waste landfill or at a Resource Recovery Facility (RRF).

Demolition debris is a component of the bulky waste stream. CGS Section 22a-209-1 defines bulky waste as waste resulting directly from demolition activities other than clean fill. In practice, waste resulting from building and highway construction activities is typically included in the collection, processing and disposal of bulky

wastes. Bulky waste also includes land clearing debris. Bulky waste is less stringently regulated than MSW in Connecticut. Consequently, demolition debris is not required to be disposed in MSW solid waste landfill or at an RRF, and is permitted to be disposed at a bulky waste landfill.

Existing Infrastructure

The terminology currently used to categorize bulky and bulky-type wastes makes it difficult to separate construction waste, demolition debris, oversized MSW, and other bulky wastes. The CT DEP estimates that in 2004, 1.1 million tons of bulky wastes were generated in Connecticut. As discussed in Appendix F, the majority of construction waste and demolition debris in Connecticut is delivered to Volume Reduction Facilities (VRFs). VRFs sort construction waste and demolition debris, removing some materials for recycling, and reduce the volume of the remaining waste to enable more cost-effective transportation.

In Connecticut, it is estimated that in 2004 approximately 7 percent of bulky waste was recovered and marketed. The majority of this recovered material was cardboard, scrap metal, and clean wood. Approximately 12 percent of the residue (non-recovered material) was disposed in Connecticut and 81 percent was transported out-of-State for final disposal. Ohio receives the majority of Connecticut's VRF residue (49 percent), with Pennsylvania (25 percent), Massachusetts (18 percent), and New York (9 percent) receiving smaller amounts.

Assessment of Existing System to Manage Construction Waste and Demolition Waste

The generation of C&D waste typically increases as communities develop housing stock and office space. Currently, only about 7 percent of C&D waste is reported as being recycled and/or reused in Connecticut. Comments from CT DEP External Stakeholders Committee reflect some dissatisfaction with the current permitting process for recycling facilities. In addition, the State's beneficial reuse policies do not appear to facilitate innovate waste reduction alternatives. Nor has the State allocated funds for the research and development of C&D waste recycling and market development.

As previously discussed, Connecticut regulations include construction waste in the MSW and demolition debris in bulky waste. However, CT DEP believes that a measurable portion of construction waste and demolition debris is managed as one waste stream. In addition, demolition debris that is transported to certain VRFs can be consolidated with MSW if they are permitted to receive MSW. In some instances, these particular VRFs are sending waste, which includes MSW, to out-of-State landfills that are only permitted to accept C&D waste. The concern about MSW being included in out-of-State waste has prompted some states, such as Ohio, to consider significant restrictions on imports from out-of-State VRFs to C&D landfills. If the states receiving waste from Connecticut VRFs become less flexible about this waste stream, they could reduce the number of facilities that may receive this waste stream

or increase the disposal cost. Beyond out-of-State shipments, CT DEP currently has no monitoring mechanism to assure that construction waste is not being disposed in bulky waste landfills.

The following strategies are examples of options for minimizing the disposal of C&D waste and maintaining capacity for disposing construction waste and demolition debris.

Strategies for Minimizing Construction Waste and Demolition Debris

The following programs are designed to increase the amount of C&D waste that is recycled, reduced or reused.

- Green building programs that promote the Leadership in Energy and Environmental Design ("LEED") rating system for new and rehabilitated buildings;
- Material recovery facilities;
- On-site grinding; and,
- Deconstruction.

Green Building Programs

Green building is an environmentally responsible approach to land development and housing construction in an effort to conserve natural resources. A green building approach can involve virtually every aspect of design and construction for both the structure(s) and landscape.

The U.S. Green Building Council ("USGBC") developed the LEED Program. LEED is a rating system used to set standards and provide evaluation criteria to determine if construction or deconstruction of commercial or institutional buildings has occurred in an environmentally friendly manner. The LEED rating system is made up of a checklist of a number of possible points and recommends strategies that enable a building project to earn these points. These points are based on a number of different categories including:

- Sustainable sites;
- Water efficiency;
- Energy and atmosphere;
- Materials and resources;
- Indoor air quality; and
- Innovation and design process.

Since these structures are typically much larger than homes, the potential impact of commercial building on the waste stream is significant. Instituting a program, such as LEED, is one way to encourage waste minimization activities in commercial building.

The USGBC has also developed a similar program for the residential sector. In addition, the American Society of Landscape Architects ("ASLA") is creating a draft tool for rating a site's outdoor ecological innovation. ASLA officials hope to work with the USGBC so that the rating standards become part of the council's widely used LEED system.

Green building programs are usually administered by a local/regional government, local utilities and/or a home builders' association. Communities with green building programs are typically responsible for developing evaluation criteria and certifying whether a building meets the criteria. Many green building efforts occur based on voluntary programs developed to encourage the use of green building practices in the construction industry. Denver, Colorado and Austin, Texas are often sited as having the largest and most well-established green building programs in the United States. Some cities, such as Frisco, Texas and Boulder, Colorado, have mandatory programs that require builders to comply with their green building programs in order to obtain building permits.

Today, there are 20 to 30 established green building programs across the country; however, more cities are developing green building programs on a regular basis. Nationwide, there were 18,887 homes built to local green building program guidelines from 1990 - 2001. In 2002 alone, there were 13,224 green homes built. It appears that the number of new green building homes will increase going forward given recent increases in the number of newly established programs across the United States.

Green Builder Case Study

The City of Austin, through its electric utility (Austin Energy), developed the first green building program in the United States in 1990. Austin Energy originally piloted this program in order to promote energy conservation. The initial idea was to work with builders to identify and develop opportunities to improve energy code compliance. Based on the success of this effort, Austin Energy expanded the program to include other factors such as water conservation, waste management, site development and impact on the community. While the program is primarily voluntary, it is required in the downtown district and for affordable housing projects. (Austin Energy staff stated green building is required for affordable housing projects in an effort to reduce future, long-term utility costs. Furthermore, their research has indicated that green building can occur for these projects without added costs to the four star level in their rating system (see the following section for further details concerning the rating system)).

Austin Energy has a five-level certification system, ranging from one to five stars. To determine the level of certification, Austin Energy uses a comprehensive, weighted checklist. All buildings must meet certain mandatory requirements, as well as attain points from specific requirements in categories that include energy, materials, water and health/safety. The materials category includes waste management issues. The mandatory requirements primarily focus on energy conservation issues, but also include limited water conservation measures.

How waste will be managed is a component of the program's rating system. Builders have an option of deciding which of the following waste management alternatives they would like to accomplish:

- At least one 50 percent recycled-content material used.
- Lumber longer than two feet is used or recycled.
- Jobsite garbage is recycled according to the City of Austin Solid Waste Services guidelines including: paper, plastic bottles, glass bottles and jars, and metal cans (no paint cans, no hazardous materials).
- Construction waste: the following construction waste is separated and re-used or recycled:
  - Stone, concrete and masonry rubble;
  - Metal scraps; and
  - Corrugated cardboard.

Staff from Austin Energy stated that having a waste management plan as a part of the construction process is very important, as it specifically guides how waste will be managed. Staff also stated that on-site grinders have been used successfully in the Austin area. Based on discussions with an on-site grinder subcontractor in the Austin area, some home builders were initially skeptical about using on-site grinding due to their unfamiliarity with this approach. However, since the subcontractor was able to provide their service at the same cost as disposal, the builder chose to try the on-site grinding. In addition, the builder has been very pleased with many of the consequential benefits including site maintenance and increased marketability.

From a long-term perspective, Austin Energy recommends using materials that will be more durable over time, as this will eliminate or delay the need for replacement, which will increase disposal quantities. For example, masonry is preferred over siding. Also, roofs using high quality shingles are recommended.

Austin Energy offers multiple training and technical assistance to the building industry. Austin Energy will conduct formal seminars for members on a monthly basis that focus on specific topics. Austin Energy is proactive in attracting green building conferences to the city, which provides opportunities for builders to access valuable information in a cost-effective manner.

One-on-one technical assistance to members is a key component of the program. Austin Energy staff will meet directly with builders and frequently conducts research for its members. Builders have stated to Austin Energy staff that this is a valuable resource that they feel comfortable using on a regular basis.

Construction Waste and Demolition Debris Material Recovery Facilities

Construction waste and demolition debris contains material such as concrete, wood, metal and cardboard that is generated from construction, demolition, and renovation projects. This material has a net economic value if it can be recovered and reused less expensively than disposed in a landfill. There are several ways to reuse and recycle

construction waste and demolition debris material. One way is through the use of a material recovery facility ("MRF"), which is a processing center that accepts mixed C&D waste, and then sorts it by material type. The MRF operator can then sell materials with an economic value. The remaining material that has little or no value, called residual, must be landfilled or otherwise disposed or reused.

To illustrate the configuration and potential of a C&D MRF, a "model facility" has been developed. This model facility assumes:

- Average amount of material processed: 580 tons per day.
- Operational schedule: 5 days a week, 8 hours a day.
- Site size: approximately seven acres of land.
- Building footprint: 52,500 square-foot building, including a scale house with both in-going and out-going scales and a pre-engineered 1,000 square-foot administrative building with a break area and small office space.

A C&D MRF collects mixed C&D waste from construction, demolition, and renovation projects. While some loads of delivered material may consist of one or two types of material, the typical load will be composed of a mixture of several materials.

The composition of C&D waste is far more variable than MSW and will depend on the type of construction or demolition, the stage of construction or demolition activity, the area of the country where the activity is taking place, and many other factors. The North Carolina Department of Environmental and Natural Resources conducted a study that included an estimate of the overall composition of C&D waste. The results are shown in Table H-3. Because no waste composition data was available for Connecticut, this estimate was used in developing the model C&D MRF.

Table H-3
Type of C&D Debris (1)

Material	% of C&D Waste Stream (by weight)
Wood	27.5%
Drywall	13.4%
Cardboard	2.7%
Metals	8.8%
Plastics	0.5%
Masonry	4.8%
Concrete	18.4%
Roofing	12.0%
Asphalt	0.1%
Miscellaneous	11.8%
Total	100.0%

(1) Source: North Carolina Department of Environmental and Natural Resources, Construction & Demolition Commodity Profile Markets Assessment 1998

The equipment used at a C&D MRF include both processing equipment, to separate the mixed C&D waste, and rolling stock, to move material within the facility.

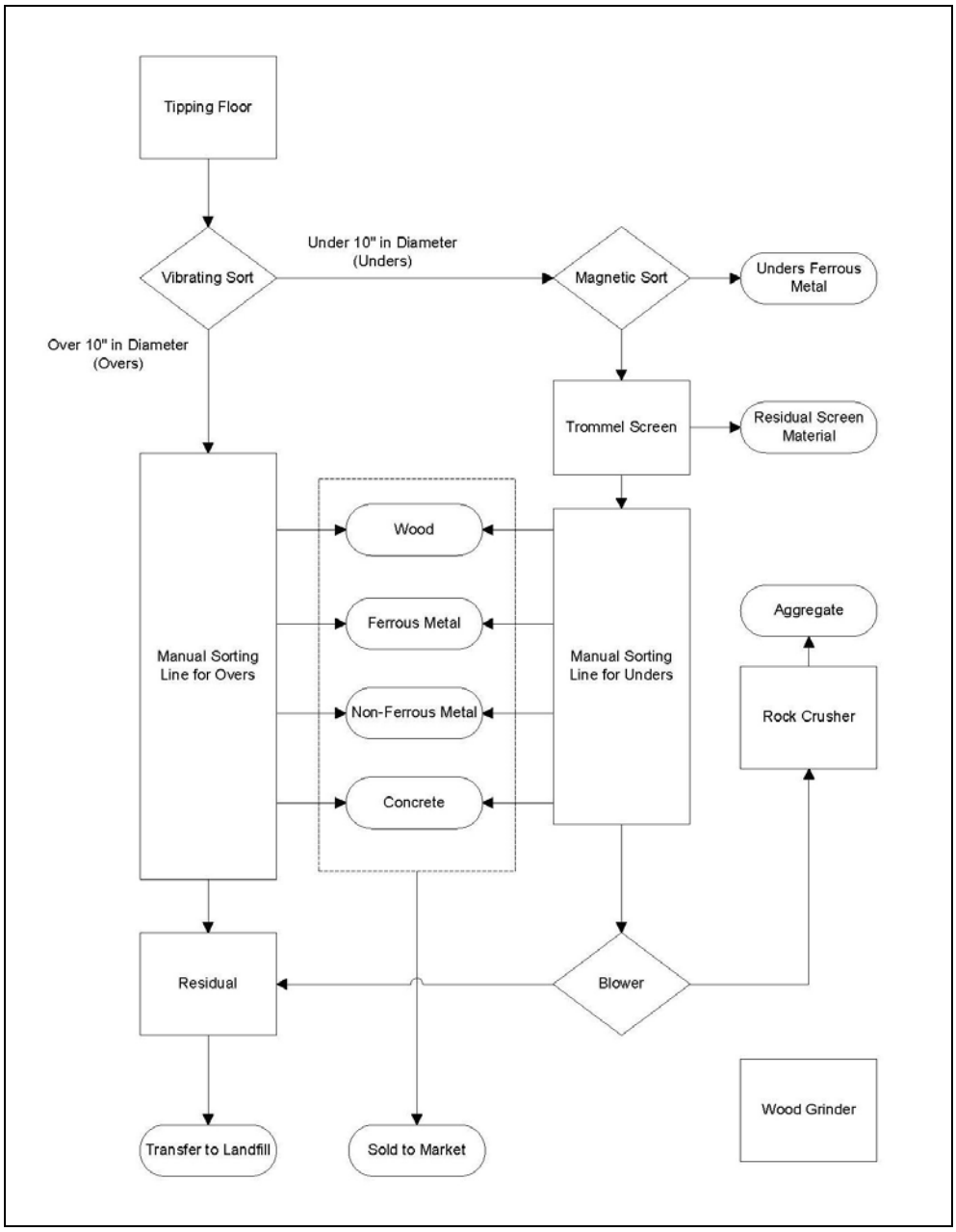
Processing Equipment

The processing equipment is the most capital-intensive component of the C&D MRF and may include:

- Vibrating screen;
- Conveyors;
- Manual picking lines;
- Magnetic sorter;
- Trommel screen;
- Storage bins;
- Rock/concrete grinder; and
- Wood grinder.

Figure H-1 presents a process flow diagram of the model facility, which is typical of C&D MRF of this size.

Figure H-1
C&D MRF Process Flow Diagram



Rolling Stock

Rolling stock is equipment that moves C&D waste within the facility and may include the following:

- A front-end loader, used on the tipping floor to lift the mixed C&D waste onto the vibrating screen (see Figure H-1);

- A second front-end loader to place residuals and recovered materials into the outbound trucks and feed wood into the grinder;

The model facility assumes that residual material is placed into the transfer trucks for disposal at a landfill using the front-end loader. The transfer trucks would be in a bay that lies below grade so that the top of the trailer is level with the floor of the C&D MRF. This allows the front-end loader to simply push the material into the transfer trailer.

The facilities at the C&D MRF site include three primary buildings:

- Main building that contains the processing equipment.
- An administrative support building.
- Scale house at the entrance/exit.

There are several categories of staffing required at a C&D MRF. Table H-4 provides an overview of the full-time staff requirements for the model facility.

Table H-4
Staffing Requirements

Staff Position	FTE Required
Heavy Equipment Operators	2
Pickers for Overs Manual Picking Line	8-12
Pickers for Unders Manual Picking Line	3-4
Picker for Rock Crusher Line	1
Floor Workers	4-6
Scale House	1-2
Crew Leader	1-2
Supervisor	1
Mechanic	1-2
Administrative Assistant	1
Total	24-35

Commodity Materials

At the present time, the materials recovered at a C&D MRF with the greatest value include:

- **Wood**: Generally, the markets for recovered wood include use as a component of engineered woods, landscape mulch, animal bedding, compost additive, and boiler fuel. These markets vary by region and depend on other available materials and which industries are located in the region. Connecticut regulations do not allow treated wood to be used as mulch, compost, or animal bedding.

- **Metal**: Scrap metals, both ferrous and non-ferrous, have well-developed markets. Although prices can suffer from large fluctuations, the demand is consistent.
- **Concrete**: Concrete and other masonry products can be ground up and used in paved roads as aggregate base, gravel roads as surfacing, and as base for building foundations. It should be noted that concrete is considered clean fill. Clean fill is not regulated by the CT DEP. Clean fill also includes brick, block, asphalt, and rock. Clean fill is recovered at a MRF is typically transported to an aggregate recycling facility for processing.
- **Cardboard**: Although cardboard represents a relatively small portion of the mixed C&D waste stream, it is currently a valuable commodity with an established market. However, the revenue from selling cardboard may depend on whether the MRF has enough cardboard to interest a potential buyer.

Non-Recoverable Materials with Alternative Uses

While some of the by-products of a C&D MRF are not considered valuable in the marketplace, the MRF operators may be able to find customers that are willing to accept the material at no cost, rather than landfilling the material and paying a tipping fee.

For example, the 3/8-inch trommel screen in the model facility allows very small size material to pass through and drop to the one of the collection bins below. This material, called residual screen material ("RSM"), is similar in many respects to dirt. While the RSM may not be sufficient for some uses, neighboring landfills may accept this material without charge for use as alternative daily cover or road stabilization.

On-Site Grinding Programs

On-site grinding is the practice of grinding or crushing building materials, which would traditionally be disposed of at a landfill, and using them on-site as a soil amendment or for erosion control. From a waste management perspective, on-site grinding can divert up to 85 percent of C&D waste generated from new home construction. It should be emphasized that care must be taken to avoid grinding any hazardous materials that may be part of the C&D waste. For this reason, although on-site grinding is taking place in other parts of the country, the CT DEP does not consider this a preferred option.

Home builders have two options for on-site grinding. The home builder may choose to own and operate a grinder or subcontract on-site grinding services. Both options use on-site grinders to process materials that have been designated for disposal from the construction of homes. Once separated, the material is processed onsite into smaller chips or dust. This material is typically used onsite for erosion control.

The economic feasibility of on-site grinding can vary depending on the following factors:

- Number of homes or buildings being serviced by the grinding operation;
- The type of construction;

- The stage of construction; and
- Cooperation between the contractor(s) and the grinding operator;

Grinders are available in a variety of types and sizes and the throughput capacity of a grinder is most often affected by its size, age, type of material and quantity of material it is processing

Materials Handling and Loading

Grinders are ideal for processing wood, stone/masonry, drywall and corrugated cardboard. C&D waste such as wood or drywall typically must be trimmed, shortened, or split prior to loading them into the grinder. Initially cutting them into sections, will increase the machines ability to grind the material without stoppages as well as allow for more material to be loaded at one time.

Table H-5 illustrates the major waste generating periods of a development and the materials that are typically generated for each phase of construction. Based on discussions with home builders, the slab, frame, and sheetrock cleanup phases generate the greatest amounts of debris and require the most time for grinding.

Table H-5
Major Waste Generating Periods

Period	Type of Waste
Slab Cleanup	Wood
Frame Cleanup	Wood
Cornered Cleanup	Stone/Masonry (1)
Rough Mechanical Cleanup	Corrugated Cardboard
Sheetrock Cleanup	Drywall
Trim Cleanup	Wood
Final Mechanical Cleanup	Corrugated Cardboard

(1) Based on discussions with grinder operators, breakdowns will most often occur during the grinding of stone, masonry or other dense materials.

Using C&D materials to replace a portion of the common fill used on the site at the end of the job can save approximately 50 cubic yards of material that would otherwise be purchased and hauled to the construction site. In addition, the use of wood chips as a means of erosion control in lieu of silt fencing can also be cost-effective.

LEED Deconstruction

Deconstruction is defined as the selective dismantling and removal of materials from buildings for reuse or recycling. This process, as an alternative to the more traditional demolition of a building, can serve as an effective way of reducing a significant amount of waste from entering the waste stream.

Deconstruction is also one of the many activities used under the U.S. Green Building Council's LEED program.

There are several keys to a successful LEED Deconstruction project, including the following:

- Waste management plans are a key to successful waste minimization efforts, as these plans provide a complete description of how waste will be managed throughout all phases of the construction project.
- Communication between the contractor and city staff should continue throughout the project. This may include phone calls, site visits, and weekly meetings. City staff should monitor operations on a day-to-day or weekly basis to observe the deconstruction process and make certain that the waste management plan is being carried out. City staff should also obtain bi-weekly or monthly reports on all disposed and recycled tonnage data.
- Cooperation between contractors and recyclers to negotiate equitable agreements, obtain load verification tickets upon depositing loads at their facilities. Whenever possible, loads should be independently verified on-site by deconstruction staff to ensure accuracy.

During the planning process it is important to establish realistic diversion goals. It is simply unrealistic to recycle or reuse all of the material from a demolition project. Typically, a goal of 70 to 80 percent diversion by weight for many projects is possible. However, the diversion goal will always be project-specific.

Funding for Construction Waste and Demolition Debris Minimization

The following serves as an illustration of the types of programs that were available for funding C&D waste minimization projects in July, 2005. Typically these programs are established and curtailed quickly and it is recommended that they be conducted on existing programs at the time the program gets underway.

Pilot programs for C&D waste minimization may require alternative funding sources during the project initiation period. Typically these funding sources are grants or loans intended to assist the program on a short-term basis. The information provided below should be used as a guide for local governments or the private sector during the planning stages of a C&D waste reduction program or project.

Funding for State Governments

Environmental Protection Agency

The U.S. Environmental Protection Agency's Office of Enforcement and Compliance Assurance offers a grant to foster environmental enforcement and compliance assurance activities and to improve compliance with environmental laws. This grant could be applied for by the State of Connecticut to enforce any laws pertaining to the recycling of C&D materials.

Funding Local Governments

U.S. Department of Agriculture

Solid waste grant No. 10.762 is offered by the U.S. Department of Agriculture's Rural Utility Service. It may be used to provide technical assistance and/or training to help associations divert materials from landfills. This grant could be used by municipalities or regions to provide consulting to either public or private sector entities in the design of C&D processing facilities (including C&D MRFs), C&D recycling education programs, C&D recycling pilot programs, or other uses that promote C&D recycling.

U.S. Environmental Protection Agency

Solid waste grant No. 66.808 is offered by the U.S. EPA's Office of Solid Waste. One purpose for the grant is to promote the use of integrated solid waste management systems to solve municipal solid waste management problems at the local levels and to assist in advancing waste minimization programs.

U.S. Department of Commerce

The Economic Development Association, which is a part of the U.S. Department of Commerce, offers grants to State and local governments geared towards the revitalization of depressed areas of cities and towns. Such grants could help to fund local private investment in the recycling industry tied to C&D waste or reuse/salvage (e.g., the funding of a C&D MRF).

The Home Depot Foundation

The Home Depot Foundation (Foundation) has four grant initiatives, one of which is associated with aiding the environment. Based on discussions with Foundation representatives, grants for C&D waste minimization projects are within the environmental topic area.

Green Building Funding Opportunities

The Home Depot Foundation

The Home Depot Foundation provides grants for environmental initiatives. Since the Home Depot Foundation is interested in building efficient and healthy homes, green building programs that promote this type of building are in line with the programs values. Grants for green building are within the Foundation's stated scope of interest.

StEPP Foundation

The StEPP Foundation aims to increase the number of energy efficiency, clean energy and pollution prevention projects implemented across the country through the funding of projects performed by governmental, non-profit, and academic entities. Based on the latest available data, the foundation awarded over $500,000 in grants in 2003.

Funding for Developers

Green Communities Program

The Enterprise Foundation and the Natural Resources Defense Council created the Green Communities Program in 2004. The initiative provides $550,000,000 over five years in low interest financing, grants, and technical assistance for the development of 8,500 housing properties across the nation that conserve energy and natural resources.

Table H-6
C&D Recycling Grant Information

Name of Program	Typical Value	Website/ Contact Information	Deadlines
Available to Local Governments			
USDA Grant #10.762	$85,000	http://12.46.245.173/cfda/cfda.html (1)	N/A
U.S. EPA Grant #66.808	$76,000	http://12.46.245.173/cfda/cfda.html	Varies by regional office
Economic Development Assoc	N/A	http://12.39.209.165/xp/EDAPublic/InvestmentsGrants/FFON.xml	N/A
StEPP Foundation	$100,000	http://www.steppfoundation.org/main.htm	N/A
The Home Depot Foundation	$5,000 - $25,000	http://www.homedepotfoundation.org/hfus/enus/apply.html	Four deadlines throughout the year
Available to State Governments			
U.S. EPA Grant	N/A	http://www.epa.gov/compliance/	N/A
Available to Developers			
Green Communities Program	$15,000 - $50,000	http://www.enterprisefoundation.org/resources/green/QA/index.asp	N/A

(1) Link to Catalog of Federal Grant Search Engine; this search engine enables user to access all federal grants. These grants may also be located by using an internet search engine such as Google.

Animal Mortalities

Overview

Animal mortalities are generated under different circumstances and at varying quantities. These can include: road kill; daily or occasional mortalities of farm animals; catastrophic farm animal mortality; and veterinary animal mortalities. Of these situations, road kill is the most problematic due to the potential for the groundwater contamination from the current practices of mass burial sites and for lack of clear directives on appropriate disposal practices. In the event of a catastrophic pathogenic mortality event, State and federal health and agricultural agencies will likely take the lead on deciding what disposal method is required. The disposal of animals is not tracked by the CT DEP and no estimate of the number of animal mortalities in Connecticut is available.

Current Management Practices

Road kill of wild and domestic animals are sporadic, scattered, and somewhat seasonal. Although not resulting in a large volume at any particular time, road kill management presents a challenge in residential areas where the carcasses cannot be dragged into the woods and buried or left to naturally decay. Mass burial of road kill is not recommended, but has been a common practice of State and local road crews for lack of better options. Daily or occasional mortalities of farm animals are managed on the farm. This is true for both large and small farm animals. If suitable soil conditions exist, animals are buried above the water table. A growing trend among Connecticut farmers is to compost daily mortalities in bins or windrows. Highly successful composting programs exist on several Connecticut farms. The majority of the poultry farms have abandoned their on-site incinerators in favor of composting. The largest poultry farm generates enough daily mortality to make rendering a feasible disposal alternative. Catastrophic farm animal mortality occurs as a result of natural disaster or disease outbreaks. Growing attention has been placed on catastrophic poultry mortalities as a result of a possible outbreak of Avian Influenza, which would likely result in the destruction of several million birds in Connecticut if that situation arises. Another concern is the possibility of tainted flocks as a result of bio-terrorism. Historically, massive animal disposal has taken place at landfills, and then at resource recovery facilities once most of the landfills were closed. Composting is a method that other states have adopted in their emergency plans for dealing with catastrophic farm animal mortalities, including Avian Influenza. Veterinary animal mortalities occur regularly and are managed through crematoriums, or are returned to the owner.

Land Clearing Debris

Overview

Land clearing debris consists of material that is generated during the first stage of construction and renovation activities. Typically, it consists of vegetative material, stumps, soil, and rocks. Private contractors or governmental entities, such as municipal public works departments or the Department of Transportation generally have the responsibility for disposing of this material. Typically, land clearing debris does not contain hazardous materials.

Generation

The annual generation and disposal of land clearing debris are not tracked. However, according to the CT DEP's 1999 Draft Solid Waste Management Plan, approximately 200,000 tons of land clearing debris are generated in Connecticut each year.

Current Management Practices

A contractor seeking to legally dispose of land clearing debris has three options:

- **Dispose of material on-site:** In many cases, stumps and brush can be buried or burned on-site. Because this avoids the cost of transporting the material, it is the preferred option and a significant portion of land clearing debris is handled in this way.
- **Deliver to a volume reduction facility ("VRF"):** Connecticut has VRFs which accept land clearing debris. These facilities chip stumps and brush and market the chips as hog fuel or daily cover for landfills. Rocks may be ground up for aggregate. In some cases, material from the VRF may be sent to out-of-State landfills. However, this option may not be available much longer. There are also a number of wood processors registered under the State recycling general permit that grind wood into mulch products.
- **Dispose of material in out-of-State landfill:** Materials may be taken to an out-of-State landfill, although transportation costs limit this option.

Some of this waste may be going to in-State bulky waste landfills, but no data is available to confirm this. Illegal disposal of land clearing may involve dumping material on private or government land.

Road Wastes (Street Sweepings and Catch Basin Cleanings)

Overview

Sweeping streets and cleaning catch basins to remove accumulated sediments, trash, and debris reduces the amount of pollutants entering Connecticut's watercourses and waterbodies. Street sweepings include sand, salt, leaves, and other debris collected during street and road sweeping operations. Street sweepings are not as clean as virgin materials and should be handled with a certain degree of care. Street sweepings usually contain low levels of chemical compounds associated with stormwater runoff. Catch basin cleanings include sand, silt, leaves, and other debris collected from stormwater run-off in catch basins. In comparison to street sweepings, catch basin cleanings are usually wetter with higher organic content. Catch basin cleanings generally have higher levels of pollutants than street sweepings; the fine grained sediments in catch basins and other drainage structures adsorb more metals and other pollutants than found in street sweepings. Catch basins are more likely to have been affected by spills and polluted runoff than street sweepings. The Connecticut Department of Transportation (DOT) and municipal public works departments are the parties responsible for managing the disposal of material from street sweepings and catch basins generated on their respective roadways.

In January 2005, the CT DEP released a document entitled a Guideline for Municipal Management Practices for Street Sweepings and Catch Basin Cleanings. This guidance document was developed to assist municipal officials in managing the use and/or disposal of street sweepings and catch basin cleanings. Addressing Best Management Practices ("BMPs") for street sweeping residuals is a necessary part of the stormwater management plan required by the State of Connecticut General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems ("MS4 Stormwater Permit"). Approximately 113 municipalities are required to obtain the MS4 Stormwater Permit and even municipalities who are not required to obtain that permit should plan for and implement best management practices for handling street sweepings and catch basin cleanings.

The actual management of this waste material has in some cases resulted in temporary storage sites stockpiling material in greater and greater amounts and impacting water resources. Some municipalities have indicated that managing this type of waste material is very costly, both in analytical testing and transport.

Generation

There are no official estimates of the amount of street sweepings and catch basin cleanings generated in Connecticut each year. The CT DEP administers MS4 General Permit and it applies to all municipalities that have urbanized areas as determined by the U.S. Census Bureau. Specifically, it applies to a town's separate storm sewer system and what measures they take to reduce or eliminate the discharge of pollutants

to that system. Registration is required to be submitted in order for the discharges to be authorized by the general permit.

The CT DEP guidance document for Connecticut's MS4 General Permit indicates that in urban areas, on average, 20.25 tons of street sweepings are collected each year. According to the CT DOT, there are 4,065 miles of State roads and 17,078 miles of roads under local jurisdiction, a total of 21,143 miles of roads. Approximately 71 percent of these are urban/suburban roads. Non-urban roads would be expected to generate smaller amounts of street sweepings. If the average generation rate for all types of roads were 12.0 tons per road mile per year, the total amount of street sweepings would be 253,716 tons of street sweepings per year. Alternatively, the guidance document suggests that half to one-third of a municipality's annual amount of sand application will be swept up during the spring and summer. No figure on the annual purchase of sand by municipalities is available. With regard to catch basins, the CT DEP guidance document indicates that in urban areas, on average, a catch basin captures 0.1 pound per day of material. Connecticut does not have a current estimate of the number of catch basins in the State; nor are there official estimates of the amount of catch basin cleanings generated in Connecticut each year.

Current Management Practices

The CT DEP guidance document outlines best management practices for both street sweepings and catch basin cleanings. With regard to street sweepings, the guidance document outlines BMPs for the following: when to sweep streets; considerations to be made regarding temporary storage sites; preparing street sweepings for reuse; and reuse options for screened sweepings with and without analytical testing. With regard to catch basin cleanings, the guidance document outlines BMPs for the following: when to clean catch basins; evaluating for evidence that the sediment and debris was polluted by a spill of oil or other hazardous substance; and the management of catch basin cleanings.

Contaminated Soils

Overview

Contaminated soils are typically generated as a result of fuel and chemical spills, leaking oil tanks, industrial accidents and improper disposal. Contaminants may include any substances which have the potential to pollute air or water. Owners of property (Responsible Parties) containing contaminated soils generally retain a private contractor to clean up the site. Both the owner and the contractor have the responsibility, and liability, for managing the contaminated soils taken from the site. The options available to responsible parties in Connecticut for managing contaminated soils are to: remediate it in place in accordance with the State's Remediation Standard Regulations ("RSRs"); deliver it to an out-of-state facility; dispose of it at an in-state landfill; deliver it to an in-state treatment facility; and reuse it in accordance with the RSRs.

Generation

The generation and disposal of contaminated soils are not tracked in Connecticut. Contractors are not required to report the volumes of contaminated soils they remove from a site, the amount they transport, or the amount they dispose (except in the case of Special Waste Disposal Authorizations noted below). Therefore, no figure on the generation of Contaminated Soils is available.

Current Management Practices

The management of contaminated soils is entirely separate from the collection and disposal of MSW and bulky wastes. A responsible party seeking to legally dispose/remediate contaminated soils has several options in Connecticut.

- **Remediate in place:** Under one or more of several remediation programs, parties may remediate contaminated soils with the approval of the DEP or a Licensed Environmental Professional.
- **Deliver to an out-of-State facility:** Responsible parties may take contaminated soils to landfills or soils reclamation facilities in neighboring states. Parties working in areas close to bordering states often take advantage of this option. Anecdotal evidence suggests that a significant fraction of Connecticut's contaminated soils are handled in this way. However, soils moving out of State are not tracked.
- **Dispose in Connecticut landfills:** Three landfills in Connecticut accept contaminated soils, but only with a "Special Waste Disposal Authorization" ("SWDA") from the CT DEP (which may take up to a month to receive). Although the individual authorizations stipulate the amount that can be disposed, the CT DEP does not aggregate these amounts for reporting purposes. Tipping fees at Connecticut landfills with a SWDA may range from $60.00 to $80.00 per ton.
- **Deliver to Phoenix Soils:** This soil remediation facility is located in Waterbury, Connecticut and charges a tipping fee of approximately $50.00 per ton.
- **Reuse of contaminated soil on another site:** Reusing polluted soil on another site requires testing of the soils and approval of the Commissioner of the CT DEP. The reuse must follow the soil reuse requirements of the State's Remediation Standards Regulations.

Illegal disposal of contaminated soils includes not only disposal of contaminated soils but also the sale of contaminated soil as clean fill. Although the illegal disposal of contaminated soils is not quantified, the CT DEP has been involved in a number of instances of clean-up efforts of illegally disposed contaminated soils.

Dredge Materials

Overview

Dredge materials result from dredging operations to deepen harbors and navigation channels, and anchorages. It consists of fine grained materials, sand, rock, and vegetative materials from the bottom of the body of water. There are a limited number of dredged material disposal sites located in Long Island Sound. In June 2005, EPA published in the Federal Register a Final Rule (40 CFR Part 228) concerning ocean disposal and the designation of dredged material disposal sites in the Connecticut waters of Central and Western Long Island Sound. This rulemaking designated two open-water dredged material disposal sites for the disposal of dredged material from harbors and navigation channels in the Long Island Sound vicinity in the states of New York and Connecticut. The designations were made to provide an alternative for the possible future disposal of such material; they are subject to various restrictions designed to support the goal of terminating or reducing the disposal of dredged material into Long Island Sound. This Final Rule requires that a regional dredged material management plan (DMMP) for Long Island Sound must be prepared by June 2013 by the Army Corps of Engineers in consultation with the states of New York and Connecticut and EPA which includes a comprehensive study of disposal alternatives. Before disposal of dredged material may be authorized at an open-water site, it must be determined that there are no practicable, environmentally preferable management options available. The types of alternatives that are generally considered include upland disposal (e.g., landfill), beneficial use (e.g., beach nourishment), or sediment treatment technologies that might render the material suitable for other types of uses. This Final Rule applies to all federal projects and/or those projects greater than 25,000 cubic yards.

Generation

According to the CT DEP, approximately 1.125 million tons of dredge material is generated in Connecticut each year from dredging operations in Long Island Sound.

Current Management Practices

Sediment dredging from harbors and channels in Connecticut and New York that is not suitable for reuse for such use as beach sand or landfill cover is, with approval by the CT DEP and the Army Corps of Engineers, barged to and deposited at four open water disposal sites in Long Island Sound. Currently there is not a treatment facility designed to treat dredged materials with the goal of reusing the material. Research, in part funded by the State of Connecticut, into the feasibility of treating dredge material is underway in a nearby region and the CT DEP will be monitoring the results of this research for possible application in Connecticut. In addition, the CT DEP will be participating in the drafting and adoption of the regional DMMP; the plan will include the identification of alternatives to open-water disposal and the development of procedures and standards for the use of practicable alternatives to open-water disposal.

The management implications regarding the potential for significant amounts of dredged disposal materials onto upland areas are considerable and must be monitored closely.

Household Hazardous Waste, including Mercury-Containing Wastes

Overview

Household hazardous wastes ("HHW") include oil paints, cleaners, pesticides, solvents, and other materials that contain hazardous materials. In addition, HHW includes batteries, electrical switches, thermometers, and other products that contain significant amounts of mercury. As the name suggests, HHW is generated by households and residents are responsible for seeing that these materials are properly disposed. These wastes are exempt from hazardous waste regulations if generated and recycled or disposed by a household. In 2006, approximately 85 percent of Connecticut's municipalities can either participate in a regional or one-day HHW event.

Generation

Connecticut does not track the generation of HHW and has only recently begun to collect data on diversion of HHW. The U.S. EPA estimates that 1.6 million tons of HHW are generated each year in the United States, a per-capita generation rate of 10.8 pounds per year. If this per-capita generation rate is applied to the population of Connecticut, the result is approximately 18,800 tons of HHW generated annually.

Current Management Practices

At the present time, Connecticut offers the following options for disposing of HHW:

- Four permanent regional collection facilities have been established and serve forty-four towns. These facilities operate on a seasonal basis (April/May through October) and must be permitted under an individual solid waste permit. Permanent HHW facilities are required to report on a biannual basis.
- One-day HHW collections are held throughout the State under either a regional entity or under separate municipal collections. In 2006, these one-day events will serve 110 municipalities. These one-day collections must be permitted under the General Permit for the One Day Collection of Household Hazardous Waste and Hazardous Waste from Certain Generators. These collections are required to report annually.
- There is one paint and stain bulking facility that is permitted under the General Permit to Construct and Operate Paint and Stain Drop Facilities and Paint and Stain Bulking Facilities. This facility serves two towns. (Permanent regional HHW facilities and one-day events also collect oil based paints and stains).

- Citizens may also dispose of HHW with their MSW, however this is not the preferred option.
- CT DEP sponsored special events to collect mercury-containing devices or elemental mercury. Such programs have targeted schools, dental offices, medical facilities (e.g., thermometer exchanges) and households (e.g., thermometer exchanges and thermostats).

The diversion of HHW through these options has only recently begun to be tracked and no figures are currently available. Based on information from other parts of the U.S., collection events generally draw between 1 and 3 percent of the people in the area and may divert as much as 10 to 15 percent of the estimated amount of HHW generated in the area. Typically diversion rates are much lower.

Connecticut has also held a number of separate events to capture mercury-containing products, such as thermometers, thermostats and switches. In 2000, the State's 137 events diverted 1,562 pounds of mercury from disposal. In 2004, 68 events diverted only 22.4 pounds or mercury.

Sewage Sludge

Overview

Sewage sludge is the product of Connecticut's 111 wastewater treatment facilities; there are 89 municipal, 20 private, and two State wastewater facilities. It is primarily organic material and is typically de-watered on site. The management of sewage sludge is the responsibility of the municipality or owner of the wastewater treatment facility. Sewage sludge is a "special waste" under Connecticut regulations and it is a waste stream that the CT DEP wanted to examine in this Plan.

Generation

Connecticut's 111 wastewater treatment plants process more than 547 million gallons of wastewater each day. As noted above, most sewage sludge is de-watered on site resulting in a generation of approximately 118,000 dry tons de-watered cake per year (processed).

Current Management Practices

Sewage sludge is handled by incineration, managed on-site/composted or is shipped out-of-state for disposal. Approximately 74 percent of all facilities in the Connecticut send their sludge to one of the State's six incineration facilities located in Hartford, Mattabasett (Cromwell), Naugatuck, New Haven, Waterbury, and West Haven. The amount of ash residue that is generated as a result of the incineration process is only reported to the CT DEP if the disposal of that ash occurs with the State, making it difficult to quantify total amounts. In FY 2004, four of the six incinerators facilities shipped this waste out-of-State. Approximately 14 percent of the sludge is shipped

directly to out-of-State facilities. Approximately 10 percent of the sludge is managed on-site/composted. Less than 2 percent of the sludge is managed in some other manner. Table H-7 identifies the in-State incineration facilities, the ash disposal site and some issues that were raised by representatives of the facilities when asked about managing this waste with regard to short-term and/or long-term time frames.

Table H-7
CT Sewage Sludge Incineration Facilities' Ash Management, 7/03 –6/04.

Facility	Ash Disposal Site	Ash Disposal Issues
Hartford MDC	In state and out of state	Contract for three years to manage ash. Concern that long-term there will be no in-State ash disposal capacity, increasing costs. Reuse is an option but the regulatory framework does not allow for use of the material at this time.
Mattabasett (Cromwell)	Town of Berlin Landfill	Have contract with Town through 2007. Economics prohibit use of the material for other than disposal at landfill.
Waterbury	City of Waterbury landfill	Landfill will close in approximately five years
New Haven	MA landfill	One year contract; to be renewed September 2006. There is not a lot of excess incinerator capacity in the system.
Naugatuck	MA landfill	Would like more cost-effective ash disposal in CT; in the long term, there is a concern of managing waste if cannot incinerate or compost sludge.
West Haven	NH landfill	Landfill space is scarce; and long-term disposal will become a problem if landfills keep closing. Must have some agreement within State to ship this material to other sites within the State.

Appendix I
ENVIRONMENTAL IMPACT OF DISPOSAL OPTIONS

Background

Environmentally compatible disposal of solid waste generated in the State of Connecticut over the next 20-year planning period is a priority Department objective. Alternative disposal options available to the Sate include:

- Adding additional in-state Resources Recovery Facility ("RRF"), along with the associated ash residue disposal capacity needed in-state;
- Implementing new in-state MSW landfill capacity; and/or
- Use in-state transfer stations for transfer and transport of wastes to out-of-state landfills and/or RRFs.

Over the next 20 years, the potential exists for new disposal technologies to emerge. Some alternative technologies (e.g., gasification) are already proven from a technological standpoint. However, achieving economic viability remains the largest hurdle for such options in the foreseeable future. As a result, such alternative technologies have not been included in this comparison. However, it is assumed that CT DEP will continue to monitor alternative technologies for their feasibility and cost-effectiveness.

This Section examines the environmental impact (on air, land, and water) associated with each alternative disposal option, and is organized accordingly. For comparison purposes, each disposal option is assumed to be compliant with the latest federal and state environmental regulations.

Applicable federal and state environmental regulations provide the basis for this discussion. The federal regulations that have led to the promulgation of state regulations include the following:

- Clean Air Act ("CAA") (42 U.S.C. s/s 7401 et seq. (1970));
- Resource Conservation and Recovery Act ("RCRA")(42 U.S.C. s/s 6901 et seq. (1976)); and
- Clean Water Act ("CWA") (P.L. 92-500) (1972).

It is important to recognize that federal regulatory standards establish minimum compliance requirements. When implementing such requirements, states may elect to impose more stringent regulations.

Other applicable state regulations promulgated from implementation of Title 22a of the General Statutes of Connecticut ("CGS") referenced in this analysis include:

- State of Connecticut Solid Waste Management Regulations (Section 22a-209);

- Section 22a-174, relating to the Abatement of Air Pollution; and
- Section 22a-430, relating to Water Discharge Permit Regulations.

The potential environmental impacts associated with each of the potentially viable solid waste disposal options available to the State are discussed in separate sections below.

Finally, an analysis of the U.S. EPA's Waste Reduction Model (a.k.a. Greenhouse Gas Model) has been conducted to assess the change in emissions of carbon and CO_2 under several waste management scenarios using data from Connecticut's Solid Waste Management Plan. A discussion of this analysis and the results appears as the final section of this appendix.

In-State Disposal – Resource Recovery Facilities

Background

Resource Recovery Facilities ("RRF") operations are subject to stringent federal regulations under the CAA, RCRA, and CWA. As a source of air emissions, each RRF is required to obtain a Title V permit issued pursuant to Title 22a of the CGS and Section 22a-174-33 of the Regulations of Connecticut State Agencies ("RCSA") and pursuant to the Code of Federal Regulations ("CFR"), Title 40, Part 70. The overarching purpose of the Title V permits is to reduce violations of, and improve enforcement of air pollution laws. More specifically, Title V permits include monitoring, testing and recordkeeping requirements, and require the source to certify each year whether or not it has met all of the requirements in its Title V permit.

RRFs are also subject to state regulations that include site-specific environmental, health risk, safety assessments. Under Section 22a-209-4 (b) (2) (B) and (C) of the State of Connecticut Solid Waste Management Regulations each RRF must have separate permits to construct and to operate. These provisions require, among other things, demonstration of how OSHA safety requirement will be met, and how the facility will minimize environmental impacts. As applicable, such a facility must also be consistent with the State Solid Waste Management Plan, the Connecticut Solid and Hazardous Waste Land Disposal Siting Policy, and the Connecticut Water Quality Standards.

It is fully anticipated that the State of Connecticut will continue to rely heavily on RRFs for the disposal of MSW during the next 20 years. Based on their track record of exceeding compliance with regulatory requirements detailed selectively in the sections below, any negative environmental impact from such operations is expected to continue to be negligible.

Potential Impact of RRFs on Air Quality

Air emissions generated by RRFs include acid gases (e.g., hydrogen chloride ("HCl"), sulfur dioxide ("SO_2"), and nitrogen oxides ("NO_X"), metals (e.g., cadmium, lead,

particulate matter, mercury), and organics (e.g., carbon monoxide ("CO"), dioxins/furans). Such pollutants, if not properly controlled and managed, can cause adverse impacts to human health and the environment such as bioaccumulation of mercury in the environment, acid rain, and ground level ozone from nitrogen oxides.

Federal CAA regulations aimed at controlling such emissions from RRF include:

- New Source Performance Standards ("NSPS");
- National Ambient Air Quality Standards ("NAAQS"),
- Prevention of Significant Air Quality Deterioration ("PSD") for attainment areas,
- New Source Review ("NSR") for non-attainment areas, and
- Operating Permit Review and periodic renewal.

On February 1991, the U.S. EPA issued NSPS for RRFs under Subpart Ea of 40 CFR Part 60, and Emission Guidelines for existing facilities under Subpart Ca of 40 CFR Part 60. Subsequently, under Section 129 of the CAA Amendments of 1990, U.S. EPA was directed to revise the earlier municipal waste combustor (i.e., RRF) regulations to address additional pollutants and to regulate both large- and small-unit facilities based on maximum achievable control technology ("MACT"). EPA promulgated revised regulations for large-unit facilities (i.e., unit capacity >250 tons per day ("TPD")) in December 1995 and these facilities were subject to compliance by December 2000. Small-unit facilities (i.e., 35 TPD to 250 TPD) became delayed due to a lawsuit and will meet similar MACT requirements by December 2005.

To determine the level of emission reductions thus far resulting from the MACT regulations, U.S. EPA collected stack data from all large units. According to a June 2002 U.S. EPA memorandum, "The performance of the MACT retrofits has been outstanding. Of particular interest are dioxin/furan emissions and mercury emissions. Since 1990 (pre-MACT conditions), dioxin/furan emissions have been reduced by more than 99 percent, and mercury emissions have been reduced by more than 95 percent." (U.S. EPA, Office of Air Quality Planning and Standards Memo, Docket A-90-45, June 2002).

These and other significant emission reductions resulted from: 1) air pollution control device retrofits on existing RRF units; 2) the retirement of several RRF units; and 3) special actions, most notably U.S. EPA's dioxin initiative and the voluntary mercury reduction by battery manufacturers.

Moreover, regarding the dioxin levels, the German Ministry of the Environment recently concluded, in a major international report, that dioxin emissions from its 66 well-controlled waste-to-energy plants are no longer a significant public health concern. The Japanese have reported similar results, and public health experts at the Massachusetts Institute of Technology have reached similar conclusions.

According to U.S. EPA, the small-unit municipal waste combustor rule will reduce emissions of organics, metals, and acid gases by about 4,700 tons per year nationwide. Further, based on 1990 emissions data, the rule will reduce dioxin emissions by at least 97 percent and mercury emissions by 95 percent. When combined with the impact of the large-unit rule, dioxin emissions from municipal waste combustors in the

U.S. will account for less than half of one percent of known sources, and mercury emissions will account for less than two percent of the U.S. inventory.

In addition to NSPS, each new RRF, depending upon its size and projected annual emissions, is subject to PSD permit requirements. PSD permit provisions include an analysis of existing air quality surrounding the facility, determination of what constitutes the Best Available Control Technology ("BACT"), emission dispersion modeling, facility plans and specifications, and public comment and hearings.

A New Source Review (NSR) Permit is also required for any proposed RRF to be located in a non-attainment area with an emission increase equal to or more that those listed in for a PSD review. Such a facility must employ emission controls that achieve either the strictest emission rate achieved by an existing facility, or the strictest limitation in the State Implementation Plan ("SIP"). The facility emission rate must also be offset by the reduction of that pollutant from an existing source, times a factor dependent upon the severity of non-attainment level of that pollutant. Further, the CAA requires each state to adopt a state implementation plan for the implementation, maintenance, and enforcement of primary and secondary NAAQS for each air quality control region in the state, including both attainment and non-attainment areas.

In Connecticut, there are both large (e.g., Bridgeport) and small (e.g., Wallingford) unit RRFs. All are subject to federal MACT rules by no later than December 2005 and to State regulations under Section 22a-174-38. Key municipal waste combustor provisions included in the state regulations relate to:

- Specific air pollutant emission limits relating to heavy metals, organics, and acid gases;
- Nitrogen oxides emissions trading program;
- Fugitive ash emission;
- Operator training and certification;
- Continuous compliance monitoring; and
- Record keeping and reporting.

Further, State of Connecticut Solid Waste Management Regulations for RRFs, under Section 22a-209-10, provides compliance requirements relating to air quality. These include requirements that air emissions, dust and odors must be controlled at all times to assure compliance with the applicable regulations of the Department of Abatement of Air Pollution.

Solid wastes that are collected for disposal at in-state RRFs are typically hauled directly from the collection point to the RRF or be taken to a transfer station and hauled a relatively short distance to the RRF. As described in the section addressing truck transportation air emissions inherent with use of out-of-state disposal options, disposal of solid waste at in-state RRFs results in far lower air emissions than the alternatives.

It should be noted that each of Connecticut's RRF units employ state-of-the art air pollutions control equipment, the requirement to perform annual emissions tests and

ambient sampling. Connecticut's NOx limitations are more stringent that current federal standards and one of the most stringent RRF mercury emission rates in the United States, leading to the installation of mercury air pollution control devices.

Potential Land-Related Impacts of RRFs

The RRF combustion process produces an ash residue (residue) amounting to approximately 25 percent (dry weight) of unprocessed MSW input. This residue is in the form of bottom ash, which comprises the largest quantity (about 80 percent), and fly ash. Bottom ash contains a combination of heavy noncombustible materials like ferrous metals, glass, and ceramics, and ash residues. Fly ash consists of the lighter products of combustion and those materials collected in the emission control equipment. Such materials are in particulate form. Most RRF operations combine the residue streams to facilitate proper management and disposal.

In Connecticut, approximately 550,000 TPY of residue is generated by the six operating MSW RRFs. Though no ash residue is beneficially used in Connecticut, across the U.S., more than 2.9 million tons of RRF ash is currently being beneficially used in various landfill applications (e.g., daily cover, road construction, landfill closure material, landfill gas venting layer).

Strict management of RRF ash residue is important since it contains constituents that could potentially adversely impact human health and the environment. Constituents of particular concern include heavy metals such as lead, cadmium, and mercury. Two major programs under RCRA regulate management of RRF ash. RCRA gave U.S. EPA the authority to control hazardous waste from the "cradle-to-grave" Subtitle C and also set forth a framework for non-hazardous waste (i.e. Subtitle D) management. RRF facilities must determine if their ash is hazardous. This is typically accomplished through testing. Per a May 1994 ruling by the U.S. Supreme Court, an RRF ash residue that exhibits a hazardous waste characteristic is defined to be a hazardous waste and must be managed accordingly. However, the testing of ash since the U.S. Supreme Court decision has generated an extensive database proving that RRF ash is not hazardous, and only subject to Subtitle D and state regulations.

The disposal of residue, under State of Connecticut Solid Waste Management Regulations Section 22a-209-14, provides compliance requirements relating to the prevention of residue dispersion, the safe management and transport of residue, engineering plans for construction and operation of residue monocells, and cover requirements. Further, State of Connecticut Solid Waste Management Regulations for RRFs, under Section 22a-209-10, provide compliance requirements relating to potential land worker safety impacts including waste restrictions, waste storage, working area, fire control, explosive protection and litter control at the RRF, operator certification, fire control, and explosion protection.

Assuming full compliance with applicable state regulations, the in-state disposal of ash residue will likely mean reduced land-related environmental, health and safety impacts when compared with the total land related impacts of transfer/transportation to out-of- state residue disposal facilities.

Potential Water Quality Impacts of RRFs

RRFs generate wastewater in a variety of forms including tipping floor runoff system wash water, ash quench water, pollution control system water, sanitary wastewater disposal, and site surface-water runoff. When not properly managed, wastewater could have a negative impact on both surface and ground waters. RRF wastewater is typically recycled in a closed-loop system. The quantity of water consumed at most facilities is a few gallons per ton of MSW burned. Such wastewater is often discharged to a local sewer system, and may require pretreatment.

The State of Connecticut Solid Waste Management Regulations for the disposal of residue, under Section 22a-209-14, provides compliance requirements relating to the protection of state waters from pollution, the use of monocells for residue disposal, leachate management, groundwater monitoring, post-closure maintenance and monitoring and stormwater control. Moreover, Section 22(a)-209(b)1 requires compliance with all applicable provisions of Chapter 446d of the General Statutes and Sections 22a-209-1 through 22a-209-13 inclusive of the Regulations of Connecticut State Agencies. A residue monocell liner system is required that consists of a protective cover, a leachate collection system, a primary liner, a leachate leak detection zone, a secondary liner, and a sub base (i.e., bottom of the liner system).

The probability of groundwater contamination from RRF ash residue operations has been proven to be negligible due to the extremely stringent siting criteria for all solid waste landfills in the state described in more detail in the next section addressing Subtitle D landfills. Moreover, proper management and handling practices driven by operating permits requiring that the appropriate wastewater treatment and disposal permits be in place at all times. Further, test results and measurements taken in the field show that the levels of metals present in waste-to-energy ash leachate are close to drinking water standards and far lower than the TCLP toxicity criteria.

In-State Solid Waste Disposal – Subtitle D Landfills

Background

It is anticipated that the State of Connecticut will rely, at least to some degree, on landfill disposal of various waste streams over the next 20 years. This is inevitable, as land disposal is required for residue from recycling and combustion, and can also be used as backup emergency disposal capacity if alternative facilities are temporarily out of service, or to handle overflow waste due to seasonal changes in generation, as well as oversized MSW.

Solid waste landfills are subject to two primary types of federal, state, and local government standards: engineering design standards and performance standards. The former are essentially building codes that specify how the landfill must be constructed. The latter apply over the facility's operating life and specify that high levels of environmental control be accomplished during the operation, closure and post-closure stages. The state agency responsible for groundwater quality may define the

maximum allowable contaminant concentration allowed in groundwater below or adjacent to the site. Landfill operators must then install the necessary control system to be in compliance with the groundwater standard. If the initial landfill design is inadequate, additional protective systems must be installed.

The federal government establishes minimum landfill standards that are implemented at the state level. For example, RCRA regulations (40 CFR, Section 258) focus on air criteria, surface water requirements, groundwater monitoring, landfill gas hazard and nuisance abatement, etc., and CAA regulations (61 RF 9905, March 12, 1996) focus on control of landfill gas emissions.

The State of Connecticut Solid Waste Management Regulations for solid waste disposal areas, under Section 22a-209-4, require that each facility must have a permit to construct and a permit to operate. These provisions require, among other things, hydro-geologic and geologic information including predictions of movement of and impact on surface and ground water, and controls necessary to protect public health, safety, and welfare.

State of Connecticut Solid Waste Management Regulations for solid waste disposal areas, under Section 22a-209-7, further detail that facilities or practices shall not cause or contribute to the taking of any endangered or threatened fish, plant, or wildlife species, pursuant to Section 4 of the Endangered Species Act. Likewise, the facility or practice shall not destroy or adversely modify the critical habitat of endangered or threatened species, as identified in 50 CFR Part 17.

As applicable, MSW landfills must also be consistent with the State Solid Waste Management Plan, the Connecticut Solid and Hazardous Waste Land Disposal Siting Policy, and the Connecticut Water Quality Standards.

Potential Impacts of MSW Landfills on Air Quality

The decomposition of solid waste in landfills generates a gas that is primarily comprised of methane and carbon dioxide. Gas from landfills is the single largest source of human made methane emissions in the U.S., contributing approximately 40 percent of the total. Each ton of methane emitted into the atmosphere has the same impact as 21 tons of carbon dioxide over a 100-year time period. Methane also cycles through the atmosphere about 20 times faster, meaning controlling this source can make quicker progress toward slowing global climate change. In addition to being a greenhouse gas ("GHG") and a hydrocarbon source, landfill gas entering the atmosphere will carry trace quantities of a large number of volatile organic compounds ("VOCs"), some of which have known adverse health effects.

Landfill gas must be properly controlled to protect human health and the environment. Gas that is not collected and/or recovered will either vent to the atmosphere or migrate underground. Landfill gas control and recovery also offers the potential of reducing the risk of global climate change. In both cases monitoring and control equipment must be used to detect and control air pollution to prevent threats to landfill employees, on-site structures and surrounding vegetation. Landfill operators must

receive adequate safety training, and gas monitoring equipment and other safety devices must be properly calibrated and maintained.

Without control, the air emissions from landfills are continuously released to the atmosphere as waste decomposes. This, along with undesirable gas accumulation, can be minimized through the use of an active gas collection system. Such a system removes landfill gas with a vacuum pump. This system may provide gas migration control, which can be directly vented to the atmosphere, burned or flared, or directed to an energy recovery system. Venting is usually done through a stack to facilitate atmospheric dispersion and to minimize potential odors.

With regard to flaring and gas recovery options, both address local air quality and safety concerns. However, only power production taps the energy value of landfill gas, while also displacing the use of fossil fuels. Further, landfill gas energy recovery operations are typically more closely managed than flaring operations, thus having greater potential for more gas being combusted in compliance with all applicable regulations and fewer emissions being emitted into the atmosphere.

Decomposition of MSW in a landfill is accelerated and increased gas emissions results when additional moisture is added into the system (i.e., bioreactor landfills). Under such a circumstance, there will be an increased environmental impact if: 1) there is no or inadequate landfill gas collection and control; 2) there is a delay in landfill gas capture/control from the onset of liquid additions; 3) the use of a porous material for promoting infiltration results in a larger loss of fugitive landfill gas emissions; and 4) there are cracks and fissures in the existing cover and/or landfill cap. In addition, there will be increased metals content in landfills if leachate, sewage sludge, CCA-treated wood, and/or industrial wastes are added.

Data from recent and historical studies of landfill gas indicate that the quantities of heavy metals in landfill gas are relatively low. The same attenuating mechanisms that naturally limit the leaching of heavy metals in landfills (reduction conditions, neutral to high pH, and presence of sulfides) also limit the release of significant gas-phase metals (including metallic or methylated mercury). In addition, the low vapor pressures for all metals except mercury are also limiting factors.

In March 1996, U.S. EPA promulgated New Source Performance Standards and Emission Guidelines (NSPS and EG) for landfills pursuant to mandates set forth under Title 1 of the CAA (61 RF 49, 9905, March 12, 1996). These rules require landfills to collect landfill gas, and prescribe design standards and performance limits for gas extraction systems (i.e., demonstrated to reduce non-methane organic compounds by 98 percent). This regulation applies to new (i.e., started operations on or after May 30, 1991) and existing (i.e., started on or after November 8, 1987), with a design capacity greater than 2.75 million tons.

In January 2003, U.S. EPA issued its final rule promulgating National Emission Standards for Hazardous Air Pollutants ("NESHAP") for MSW landfills (FR Volume 68, Number 11, January 16, 2003, pages 2227 – 2242). The final rule is applicable to both major and area sources and contains the same requirements as the NSPS and EG. The final rule adds startup, shutdown, and malfunction ("SSM") requirements, adds operating condition deviations for out-of-bounds monitoring parameters, requires

timely control of bioreactor landfills, and more. The final rule fulfills the requirements of section 112(d) of the CAA, which requires the Administrator to regulate emissions of hazardous air pollutants listed in section 112(b), and helps implement the Urban Air Toxics Strategy developed under section 112(k) of the CAA. The intent of the standards is to protect the public health by requiring new and existing sources to control emissions of Hazardous Air Pollutants (HAP) to the level reflecting the MACT.

The HAP emitted by MSW landfills include, but are not limited to, vinyl chloride, ethyl benzene, toluene, and benzene. Each of the HAP emitted from MSW landfills can cause adverse health effects provided sufficient exposure. For example, vinyl chloride can adversely affect the central nervous system and has been shown to increase the risk of liver cancer in humans, while benzene is known to cause leukemia in humans.

Further, RCRA Subtitle D standards prohibit the routine open burning of solid wastes. Infrequent burning of agricultural waste, debris from emergency cleanup operations, etc., is allowed subject to federal and state air pollution control regulations. Any designated area for burning must be far enough away from the landfill to avoid burning other solid waste. Other regulations have also been promulgated under the CAA that apply to control of air emissions from new and existing landfill sources. These include: 1) NAAQS; 2) PSD for attainment areas; and 3) NSR for non-attainment areas.

The State of Connecticut Solid Waste Management Regulations address the control of decomposition gases from landfills through requirements for gas venting and monitoring under Section 22a-209-7 (n), but do not directly address landfill gas collection. Likewise, the Regulations for solid waste disposal areas, under Section 22a-209-7(r), detail provisions relating to air quality including open burning restrictions, and also stipulate that dust and odors shall be controlled at all times to assure compliance with applicable regulations established by the Department for the Abatement of Air Pollution.

Connecticut currently requires NSR permits and Best Available Control Technologies for landfills with greater than 15 tons per year of any air pollutant. In addition, a Title V permit may be required based on size criteria.

Potential Land-Related Impacts of Subtitle D Landfills

Solid waste landfills are subject to federal regulations under RCRA Subtitle D (40 CFR Parts 257 and 258). U.S. EPA's Subtitle D rule establishes facility design (e.g., for liners, leachate control systems, final cover systems, etc.) and operating standards, groundwater monitoring, corrective action measures, and conditions for closing and providing post-closure care for municipal landfills. State regulations under Subtitle D can be flexible to accommodate local conditions.

Uncontrolled landfill gas migration can be a major threat to landfill employees, buildings located on and in close proximity to the site, and surrounding vegetation. Landfill gas must be controlled to avoid explosions and vegetation damage near the

landfill, and the threat of asphyxiation in confined spaces. RCRA Subtitle D standards limit landfill gas migration to no greater than 25 percent of the lower explosive limit in occupied structures. Landfill buildings and monitoring probes located around the landfill must be tested quarterly for methane concentrations. RCRA Subtitle D also defines requirements for methane emission monitoring at landfill, during operation and for the 30-year post-closure period (i.e., 40 CFR Section 264).

RCRA Subtitle D requirements that minimize impacts on surrounding lands include the operating requirement that all solid waste received must be covered with six inches of an earthen material at the end of each operating day. This prevents the exposure of landfill waste to birds, insects, and rodents, which represent the primary transmission pathways of human disease. Covering MSW also minimizes the potential for landfill fires, reduces odor, and controls blowing litter.

The State of Connecticut Solid Waste Management Regulations for solid waste disposal areas, under Section 22a-209-7, meet or exceed all of the above requirements addressing blowing litter, cover operations and vector control as specified in Sections 22a-207 (k), (l) and (m), respectively.

RCRA Subtitle D also requires that MSW landfills be closed using a final cover system composed of an infiltration layer overlaid by an erosion layer. The goal of minimizing liquid infiltration into the landfill is achieved by way of good surface drainage and runoff with minimal erosion, among other factors. Surface water runoff must also be properly controlled to prevent excessive erosion and soil loss.

Proper landfill design and operation are always in the long-term financial interest of the landfill construction and operation permittee, since, under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), landfill owners are held responsible for environmental damage and cleanup from the time of startup of the facility through the 30 years following closure. Furthermore, it is worth noting that even claims and documentation that a landfill has been in compliance with regulatory standards throughout construction and operation has not been an adequate defense against pollution damage claims.

Potential Water Quality Impacts of Subtitle D Landfills

Under RCRA Subtitle D regulations, all new MSW landfills and expansions at existing facilities must include a composite liner system (e.g., combination of synthetic and natural liners) and a leachate collection system, or meet a groundwater protection performance standard. This is aimed at preventing leachate that is formed as water migrates through the MSW from migrating from the site and into ground or surface waters beyond the landfill boundary.

The landfill groundwater protection performance standard specifies that groundwater contaminant concentrations flowing away from the landfill must meet water quality standards for a range of chemicals including heavy metals such as arsenic, cadmium, lead, mercury, and zinc.

Many landfills in the U.S. constructed and operated prior to RCRA Subtitle D requirements are unlined or have liner systems that cannot adequately contain the

leachate. Leachate chemicals may then pass through the landfill base and may undergo various destruction and conversion reactions as they pass through underlying formations. One example of this process, known as attenuation, is heavy metals in leachate being retained by clay soil under the landfill.

Regarding this issue, it is worth noting that a study commissioned by the Solid Waste Association of North America ("SWANA") Applied Research Foundation (as reported by Jeremy O'Brien, "Summary of the SWANA Applied Research Foundation's Findings," MSW Management May/June 2005) found that all available research data on the subject indicate that despite the dramatic increase in the disposal of discarded consumer electronics in recent years, the tonnages of heavy metals being disposed in MSW landfills have actually decreased over the last 15 years, primarily as a result of lead-acid battery recycling efforts. In total, five studies representing all recent published investigations regarding leachate characteristics were reviewed in the SWANA research effort and all of these studies concluded that heavy metal concentrations in leachate are, on average, relatively low.

RCRA Subtitle D also requires that ground water monitoring systems be in place for new, existing, and lateral expansions of existing landfills. This is necessary to measure groundwater quality at the facility and determine if any contaminants have been released through the landfill base. RCRA calls for detection monitoring to establish background concentrations for a set of detection monitoring parameters, assessment monitoring to determine if maximum Safe Drinking Water Act levels have been exceeded, and corrective actions, as needed. Landfill owners may have to provide a temporary supply of drinking water, if in violation, and corrective actions must continue until groundwater standards compliance is accomplished for three consecutive years.

In addition, RCRA Subtitle D specifies landfill run-on and runoff controls for rainfall and snow melt, calling for the development of drainage channels within the site. Drainage structures should generally be designed for 25-year storms. Implementation of a detention basin should also be considered to minimize siltation problems downstream. This allows for the testing of runoff water for chemical contamination prior to discharge into a stream or lake. Ultimately, the runoff must be managed in compliance with the point and non-point source requirements of the Clean Water Act.

Landfill gas recovery projects also typically generate wastewater from maintenance and cleaning, domestic wastewater, and cooling tower blowdown. This water may be treated onsite or sent to a municipal wastewater treatment plant. The wastewater treatment facility operator will ensure that standards governing pollutant concentrations in incoming wastewater streams are complied with. For projects that discharge wastewater into rivers or other surface waters, a National Pollution Discharge Elimination System ("NPDES") permit is required and typically issued by the state.

State of Connecticut Solid Waste Management Regulations for solid waste disposal areas, under Section 22a-209-7, far exceeds Federal Standards. Specifically, these regulations (1) require any solid waste landfill to install a double liner with a sub base five feet above the maximum high water table (Section 22a-209-14(g)), and (2) require

as set forth in Section 22a-430-4(c)20(E)(vii) of the Water Discharge Permit Regulations that the Commissioner shall not issue a permit for the discharge of leachate from a solid waste disposal area unless;

- Assuming for purposes of analysis the absence of any means at such solid waste disposal area to collect or treat leachate, the discharge of such leachate would not pollute any receiving surface water classified as B or SB by the Water Quality Standards or interfere with the attainment of any water quality classification goal that has been adopted for such surface water in the Water Quality Standards;
- The permit applicant has the right of possession, by means of fee interest, easement, or otherwise, to the zone of influence of such solid waste disposal area and;
- No potable water supply well is located within the zone of influence of such solid waste disposal area and no portable water supply well is located such that recharge of such well from such zone of influence could be induced by pumpage, unless the permit applicant will, with the approval of the Commissioner and the agreement of the user of any such we, provide an alternate supply of potable water to such user.

In addition, Section 22a-209-14 requires that: leachate from a leachate collection system installed pursuant to subsection (g) of this section and leachate from a leachate treatment system installed pursuant to a permit issued under Section 22a-430 of the General Statutes and Sections 22a-430-3 and 22a-430-4 of the Regulations of Connecticut State Agencies shall be discharged only in accordance with the terms of such permit, and shall be subject to all requirements specified in such permit.

Moreover, in addition to the requirement of 22a-209-7(c)(1), and Section 22a-430-4(c)20(E)(vii) above, Section 22a-209-7(c)(2) specifies that: a new or existing solid waste disposal area shall not impair the quality of surface or ground water beyond the solid waste boundary to a degree that would degrade the quality of such waters beyond the water quality classification established by the Department in accordance with Section 22a-426 of the Connecticut General Statues, The Connecticut Water Quality Standards and Criteria, as amended, or the standards for quality of public drinking water established by the State Department of Health Services and contained in Section 19-13-B102 of the Regulations of Connecticut State Agencies, as amended. In those cases where the existing water quality fails to meet the established standards, the disposal area shall not further degrade the water quality.

Enforcement by the Commissioner of compliance with Section 22a-430-4(c)20(E)(vii) in the site application and approval process effectively precludes the risk of negative environmental impact on either the ground and surface waters of the state.

Transfer to Out-of-State Disposal Facilities

The option of sending solid waste out of state eliminates the potential environmental impacts from expansion of RRFs or development and operation of new landfills. However, inherent with the selection of this option is the construction and operation of

transfer stations, and the truck/trailer and/or rail car transportation of waste over state highways and/or rail lines. The potential environmental advantages and disadvantages associated with the transfer, transportation and disposal components of this option are described below.

Potential Environmental Impacts Associated with Transfer Stations

In considering the alternative of sending solid wastes to out-of-state landfills or RRFs over the next 20 years, the operation of transfer facilities has potential advantages and disadvantages when compared to in-state disposal options. For the purposes of this analysis, the potential impacts associated with the siting and operations of volume reduction facilities ("VRFs") are assumed to be similar to those for transfer stations and are addressed as such.

A number of environmental benefits can be accrued from transfer of solid waste, including the following:

- Reduced route collection vehicle impacts on traffic and air emissions;
- Reduced fuel usage for route collection vehicles;
- Increased flexibility in selecting more environmentally sound disposal facilities;
- The potential to remove recyclable materials and thereby reduce energy and GHG emissions associated with product manufacture using virgin materials; and
- The potential to reduce the volume of wastes; thus reducing truck traffic, energy usage, air emissions and land consumption and potential environmental impacts of landfills.

However, there is difficulty in siting and permitting new transfer facilities, especially in heavily populated areas, due to the perceived negative environmental (and other) impacts. Various interest groups are likely to oppose this type of waste management facility in any community with its inherent truck traffic and noise, and potential impacts on surrounding air, water and land.

A current issue of major environmental concern associated with rail haul is the use of a transfer facility on railroad property operating without adequate environmental permits. Under the federal Interstate Commerce Commission Termination Act (49 U.S.C. Section 10510), rail yards are exempt from local zoning and permitting requirements ostensibly to promote the efficient operation of railroads and protect interstate railroads from local interference. In New Jersey and other parts of the Northeast, this has resulted in some rail sites essentially becoming open-air waste-processing operations with waste being dumped on the ground, processed and shipped out on rail cars – without state or local permits in place. However, the CT DEP has taken the position that rail yards are not exempt from local zoning and permitting requirements.

In efforts to combat such practices, the New Jersey Department of Environmental Protection has assessed a $2.5 million fine against a rail company operating five solid

waste transfer facilities in North Bergen. Moreover, waste industry associations are supporting the Solid Waste Environmental Regulation Clarification Affecting Railroads Act of 2005 (S-2005) a federal bill introduced by both U.S. Senators from New Jersey. This legislation would transfer oversight of rail yard transfer stations from the Surface Transportation Board.

The State of Connecticut Solid Waste Management Regulations addresses solid waste transfer station siting and operation under Section 22a-209-4. This section specifies that each transfer station facility must have a permit to construct and a permit to operate. Most importantly, the information required for a permit to construct a transfer station, specified in Section 22-209-4(b)(2)(B), includes all of the same information required for permits to construct solid waste disposal areas enumerated in Section 22-209-4(b)(2)(A). As applicable, such facilities must also be consistent with the State Solid Waste Management Plan, the Connecticut Solid and Hazardous Waste Land Disposal Siting Policy, and the Connecticut Water Quality Standards.

In addition, State of Connecticut Solid Waste Management Regulations for solid waste transfer stations, under Section 22a-209-9, provide environmental compliance requirements relating to waste storage, litter control, the control of dust and odors, restrictions on open burning, fire control, waste restrictions, vector control, and more.

The status of federal regulations aimed at minimizing air quality impacts and the relative impact of both transportation options are addressed in the discussion of each transportation option that follows.

Potential Environmental Impacts Associated with Transportation

Transportation of solid waste from in-state transfer stations to out-of-state disposal facilities may be provided via truck/trailer or rail haul. Both of these options generate air emissions from combustion of diesel fuel that are of concern to public health and the environment. The degree to which such emissions cause a negative impact is determined largely by such factors as how old the vehicle/engine is, cleanliness of the diesel fuel, type of vehicle engine, how far the vehicle travels, and whether the vehicle is in compliance with regulatory requirements.

The environmental impacts associated with each mode of transportation are addressed separately in the following sections.

Truck/Trailer Systems

Most transfer systems use tractor-trailers to carry solid waste to the disposal site. These trailers are classified as either compaction (i.e., rear-loading, enclosed, with a push-out blade for unloading) or non-compaction (i.e., open top for loading, with a tarp or top doors to cover the MSW, and moving floor to unload material).

From an environmental health and safety impact perspective, truck/trailer systems must be designed to meet the following type of requirements:

- All waste must be covered during transportation to prevent littering and exposure to precipitation;
- Vehicles must be operated safely along the hauling routes to avoid accidents and spills;
- Truck capacity must not exceed road weight limits to prevent roadway wear and tear;
- Truck design and construction must prevent liquids leakage during transportation to avoid potential land and water impacts; and
- Unloading methods should be dependable and not subject to frequent downtime (i.e., worker exposure issue).

Further, to minimize hazards to transportation personnel, truck and rail transport employees must be properly trained to identify hazardous and other unacceptable wastes, and receive ongoing environmental safety and health training from employers.

Potential Truck/Trailer Impacts on Air Quality

There are a number of factors that affect the rate at which any vehicle emits air pollutants. Some of the most important are the vehicle age and accumulated mileage, type of fuel used (gasoline, diesel, others), ambient weather conditions (temperature, precipitation, wind), the maintenance condition of the vehicle (well maintained, in need of maintenance, presence and condition of pollution control equipment), and how the vehicle is driven (e.g., long cruising at highway speeds, stop-and-go urban congestion, typical urban mixed driving).

The Environmental Protection Agency ("EPA") has developed and refined a series of computer models that estimate, for different types of highway vehicles, the fleet-wide in-use average emissions as a function of many variables. The EPA data presents average emission rates for gasoline-fueled and diesel heavy-duty vehicles.

Heavy-duty vehicles, or heavy-duty trucks, are vehicles that are greater than 8,500-pound gross vehicle weight and are equipped with heavy-duty engines, a distinct category under EPA's highway vehicle pollution control regulations. Such vehicles emit large amounts of CO, NO_X and particulate matter ("PM"), which contribute to serious public health problems including premature mortality, aggravation of respiratory and cardiovascular disease, and increased incidence of lung cancer. The heaviest trucks, in GVW classes VIIIa (33,001 lb. to 60,000 pound GVW) and VIIIb (over 60,000 lb. GVW) are used mostly for the interstate transport of goods including solid waste, and in some cases accumulate more than 250,000 miles annually.

The most current version of the computer model used by EPA to estimate average in-use emissions from highway vehicles is MOBILE6.2. The emission rates (also commonly termed emission factors) presented for diesel heavy-duty trucks in this discussion are based on national average data representing the in-use fleet as of July 1, 2005. These estimates use national averages for most of the variables that affect emission rates, as discussed in greater detail in the following section, and are based on average summertime weather conditions. These estimates are suitable for use in obtaining first-order approximations of vehicle emissions. The emission rates for

hydrocarbons ("HC"), CO, NO_X, and particulate matter ("PM_{10}", or particulate 10 microns diameter and smaller; and "$PM_{2.5}$", or particulate 2.5 microns diameter and smaller) shown in Table I-1 are from the most recent version of the MOBILE6.2 highway vehicle emission factor model. They assume an average, properly maintained heavy-duty truck on the road in July 2005, operating on typical gasoline or diesel fuel on a warm summer day (72-92°F). Emission rates can be higher in very hot weather (especially HC) or very cold weather (especially CO).

Table I-1
Average Heavy-Duty Truck Emissions by GVW Class (2005)

Truck GVW Class	Emission Rates (Grams/Mile)				
	HC	CO	NO_X	$PM_{2.5}$	PM_{10}
VIII (a)	0.55	3.21	12.6	0.33	0.36
VIII (b)	0.70	4.38	16.2	0.36	0.42

Under 40 CFR Parts 69, 80, and 86 of the Clean Air Act, the U.S. EPA issued a final rule in January 2001 regarding the control of air pollution from new motor vehicles, including heavy-duty trucks. The rule's requirements go into effect in 2006 for low-sulfur diesel and model year 2007 for cleaner engines (i.e., applying after treatment pollution control technologies). This is aimed at reducing PM and NO_X emissions from these sources by 90 percent and 95 percent below current standard levels, respectively.

This rule will require a 97 percent reduction in the sulfur content of highway diesel fuel from its current level of 500 parts per million ("ppm") to 15 ppm. Further, engine manufacturers will have flexibility to meet the new standards through a phase-in approach between 2007 and 2010. The fuel provision will go into effect in June 2006 and will be phased-in through 2009.

Class VIIIa and Class VIIIb vehicles emissions, on average, on grams per mile ("g/m") traveled basis to meet 2010 requirements are summarized in Table I-2.

Table I-2
Average Heavy-Duty Truck Emissions by GVW Class (2010)

Truck GVW Class	Emission Rates (Grams/Mile)				
	HC	CO	NO_X	$PM_{2.5}$	PM_{10}
VIII (a)	0.08	0.44	1.82	0.44	0.049
VIII (b)	0.10	0.63	2.35	0.057	0.048

As illustrated in Table I-1, when MSW and bulky wastes are transported out of the state there is a significant increase in air emissions associated with the transportation

that is largely precluded by disposal at in-state RRFs. To quantify the accumulative impact of air emissions, the Department calculated truck diesel engine emissions that would be largely eliminated by though disposal at in-state RRFs.

Department data suggests that approximately 400,000 TPY of MSW and 900,000 TPY of bulky waste were transported out-of-state in FY 2004. Assuming an average of 20 tons per trip, this translates to 20,000 trips for MSW and 45,000 trips for bulky waste annually. Even under a conservative assumption that all of the waste is delivered to the closest cost competitive landfills in Eastern Pennsylvania an average roundtrip distance of approximately 400 miles from central Connecticut is required. Estimates of total emissions associated with transportation using these assumptions are summarized in Tables I-3 and I-4 for MSW and bulky waste respectively. As illustrated in these tables, if all of the MSW and bulky wastes currently transferred out of state were transported by truck, it is estimated that over 606 tons of diesel engine pollutants would be added to the air in Connecticut and states to the southwest.

Table I-3
Estimate of Annual Emissions from Truck Transportation of MSW to Cost-Competitive Out-of-State Landfills

Type of Emission	Truck Transport				
	Emission Rate (1) (Grams/Mile)	Roundtrip Miles	Annual Trips	Annual Miles Traveled	Annual Emissions (tons)
HC	0.70	400	20,000	8,000,000	6
CO	4.38	400	20,000	8,000,000	38
NO_X	16.2	400	20,000	8,000,000	143
$PM_{2.5}$	0.36	400	20,000	8,000,000	3
PM_{10}	0.42	400	20,000	8,000,000	4

(1) For heavy duty truck GVW Class VIII(b)

Table I-4
Estimate of Annual Emissions from Truck Transportation of Bulky Waste to Cost-Competitive Out-of-State Landfills

Type of Emission	Truck Transport				
	Emission Rate(1) (Grams/Mile)	Roundtrip Miles	Annual Trips	Annual Miles Traveled	Annual Emissions (tons)
HC	0.70	400	45,000	18,000,000	14
CO	4.38	400	45,000	18,000,000	87
NO_X	16.2	400	45,000	18,000,000	321
$PM_{2.5}$	0.36	400	45,000	18,000,000	7
PM_{10}	0.42	400	45,000	18,000,000	8

(1) For heavy duty truck GVW Class VIII(b)

Comparison of existing diesel engine emissions with the air emissions from RRFs is also useful to put emission levels into perspective. According to a report by the Waste-to-Energy Research and Technology ("WTERT") Council, headquartered at Columbia University, diesel trucks transporting MSW from NYC to Pennsylvania and Virginia emit five times more particulate matter per ton of MSW than if combusted in more local RRF operations (Columbia University WTERT Report, Dr. N. Themelis, April 13, 2005).

Potential Land and Water Related Impacts

The use of truck/trailer systems for transportation can also have potential negative environmental and safety impacts on surrounding lands and surface waters. These potential impacts include:

- Contribution to increased roadway congestion; especially on the overburdened interstate highways in the Northeastern and Mid-Atlantic States;
- Roadway wear and tear;
- Litter and associated pollution of adjacent surface waters if waste is not properly contained;
- Potential leakage of liquids onto highways and into adjacent surface waters from waste cargo if not properly contained; and
- Potential for hydraulic oil and diesel fuel spills and potential contamination of surface water, and potentially other waterways.

Rail Haul Systems

A viable and increasingly popular alternative to tractor-trailers is the use of rail haul for waste transport to more distant landfill or RRF operations. While this option has not traditionally accounted for much of the waste transferred in the U.S., the use of rail

haul is growing. This option makes particular sense when rail service is available to both the transfer facility and the disposal facility, and, typically, the hauling distance is 150 miles or more.

Solid waste can be rail hauled using dedicated gondola cars (i.e., with removable roofs for direct loading) or containerized intermodal freight systems (i.e., requiring double handling of waste to load and unload). If the transfer station or disposal facility is not served by rail, trucks must be used to collect and/or deliver the materials. This would result in additional environmental impact (e.g., air emissions, etc.).

Decision-makers should bear in mind these and other possible environmental impacts associated with rail haul, and potential opposition from communities along the transportation route. Rail cars should be kept clean and covered, and shipments should be scheduled to minimize any travel delays.

Impacts on Air Quality

Similarly to heavy-duty trucks, locomotive diesel engines contribute significantly to air pollution. This is the case, even though diesel-powered locomotive engines being produced today have to meet relatively modest 1997 emission requirements.

Emissions from diesel-powered locomotive engines are measured on a grams-per-gallon of fuel used basis since locomotives consume fuel more on a mass-per-work basis; i.e., a locomotive pulling a fully loaded train of rail cars consumes more fuel and emits more pollution than a train of empty cars. U.S. EPA estimates locomotives emit, on average, the following emissions on a grams per gallon of fuel ("g/gf") consumed basis:

- For 1998 (Pre-control): NO_X, 270 g/gf; PM 10, 6.7 g/gf;
- For 2005: NO_X, 200 g/gf; PM 10, 6.6 g/gf; and
- For 2020: NO_X, 140 g/gf; PM 10, 4.9 g/gf.

In May 2004, U.S. EPA finalized new requirements for non-road diesel fuel as part of the Clean Air Non-road Diesel Rule (40 CFR Parts 9, 69, et al.). This rule will decrease the sulfur levels allowed for fuels used in locomotives by 99 percent; from about 3,000 ppm to 15 ppm when fully implemented in 2012. This will result in immediate public health and environment benefits through the reduction of PM from existing engines.

At the same time, U.S. EPA announced its intent to propose more stringent locomotive engine emission standards (40 CFR Parts 92 and 94), similar in stringency to the standards adopted for heavy-duty diesel-powered trucks (40 CFR Parts 69, 80, and 86). EPA estimates that a 90 percent reduction in PM and NO_X emissions can be accomplished through the use of advanced emission-control technologies. New engine standards, based on engine horsepower, begin to take effect in 2008. Engines with more than 750 horsepower will have until 2015 to meet the emission standards.

In order to make a meaningful comparison between heavy-duty trucks and locomotive air emissions, it is necessary to convert locomotive emissions from grams-per-gallon of fuel consumed to grams-per-vehicle-mile traveled. This is accomplished by

applying a reasonable average fuel economy multiplier number (i.e., how many miles per gallon, on average, a typical locomotive consumes). This is estimated to be 7.7 gallons of fuel per mile. Applying this conversion factor to the grams-per-gallon consumed numbers summarized above yields the following estimated grams of emissions per mile traveled for locomotives:

- For 1998 (Pre-control): NO_X, 2,076 g/m; PM 10, 51.5 g/mile;
- For 2005: NO_X, 1538 g/m; PM 10, 50.8g/mile; and
- For 2020: NO_X, 1077 g/m; PM 10, 37.7g/mile.

Although locomotives clearly generate more NO_X and PM emissions than heavy-duty diesel trucks on a grams per mile basis, they also transport far more tonnage of material per mile. Therefore, a valid comparison between trucks and locomotives requires using grams of pollutant per ton-mile. Unfortunately, the U.S. EPA has not completed such an analysis since 1994. This 1994 analysis provided an estimate of the relative NO_X emissions resulting from movement of freight by truck and locomotive, taking into account the existing and anticipated air regulations at that time. Using the averages of the results calculated for 38 truck and locomotive scenarios evaluated result in the following relative estimates of air emissions:

- In the year 2005, NO_X emissions from the movement of freight by truck can be expected to be between 2.8 and 5.0 times higher, on average, than NO_X emissions from rail transportation of the same freight between the same two points; and
- In the year 2010, NO_X emissions from the movement of freight by truck can be expected to be between 3.2 and 5.0 times higher, on average, than NO_X emissions from rail transportation of the same freight between the same two points.

It is important to bear in mind that additional truck and locomotive emissions standards have been promulgated. As of 2005, U.S. EPA experts believe that while NO_X emissions from locomotives versus heavy-duty diesel trucks (i.e., on a per ton mile basis) are less, the difference is less dramatic than stated in the 1994 analysis.

Potential Land and Water Related Impacts

The use of rail-haul systems for transportation can have the same potential negative environmental and safety impacts on surrounding lands and surface waters as transportation via truck/trailers.

These potential impacts include:

- Litter and associated pollution of adjacent surface waters if waste is not properly contained;
- Potential leakage of liquids along railroad sidings during storage and along tracks during transport into adjacent surface waters from waste cargo if not properly contained; and
- Potential for hydraulic oil and diesel fuel spills and potential contamination of surface water and potentially other waterways.

Potential Environmental impacts Associated with Out-of-State Disposal – Subtitle D Landfill or RRF

Out-of-state solid waste landfills and RRF are subject to the same federal environmental regulations as those in Connecticut. Depending upon the regulations and enforcement resources applied in the state in which these disposal facilities are located; there may be more or less stringent compliance requirements at such facilities. In either case, the environmental impacts on air, water and land within the State of Connecticut associated with use of out-of-state disposal facilities are limited to those emanating from the transfer and transportation components. However, Connecticut is concerned with all environmental impacts that stem for solid waste management, not just those taking place within their borders.

Summary

There are only three potentially viable options for the disposal of solid waste generated in the State of Connecticut over the next 20 years. These include:

- In-state disposal at RRFs;
- In-state disposal of MSW at a Subtitle D Landfill; and
- Transfer and transportation to out-of-state landfills or waste-to-energy facilities.

Each of these options has the potential of adversely impacting human health and the environment if not properly managed, and are subject to federal and state environmental regulations to help ensure this does not happen. Nonetheless, assuming facility compliance with state and federal regulations, the summary in Table I-5 illustrates that disposal at in state RRFs poses less potential risk of negative environmental impacts than landfills located either in or outside of the State; generating lower air emissions, being relatively isolated from surface and groundwater, and occupying a smaller footprint on land.

Table I-5
Summary Comparison of Environmental Impacts of Solid Waste Disposal Options

Disposal Option	Air	Land	Water
In-State RRF	Minor impact on air quality due to U.S. EPA MACT and state regulations that include continuous emissions monitoring to ensure compliance. RRF ash residue does not generate greenhouse gas emissions. Energy generation reduces consumption of fossil fuels at energy generation alternatives.	Negligible impact on land since ash routinely tests as a non-hazardous material. No litter, odor, vector, bird or potential fire and explosion problems. Facilities occupy small footprint relative to landfills.	Negligible impact on water since RRF wastewater is typically recycled in a closed-loop system. Metals present in RRF ash leachate are close to drinking water standards and far lower than the toxicity test criteria.
In-State Landfill	Landfills are the largest source of human-made methane emissions in the U.S. Federal regulations controlling such emissions apply only to large facilities (>2.75 mm tons capacity). Air emissions monitoring not as stringent as applied to RRF.	Landfill gas migration poses the threat of explosion, vegetation damage, and asphyxiation if not managed properly Greater potential for wind blown litter compared to RRF due to being exposed to the elements. Greater potential for odor, vectors, attraction to birds and other wildlife.	Greater potential for water contamination at landfills versus RRF due to the diversity and variability associated with elements found in MSW leachate. Continuous exposure to the elements increases risk of impact on water quality. Requires intensive post-closure care period with potential remediation activities
Out of State Disposal	Far greater impact on air quality due to emissions from heavy-duty trucks and/or locomotives, coupled with associated road congestion (trucks), and other potential impacts (e.g., fossil fuel consumption), compared to in state disposal option(s).	Impact of transfer facilities in CT that includes traffic and attraction to vectors, birds and insects.	Potential impact on CT water resource only from transfer facilities and potential of spills from truck/trailer or rail haul leakage or accidents.

WARM (Greenhouse Gas Model)

Introduction

The United States Environmental Protection Agency ("US EPA") has developed the Waste Reduction Model ("WARM") to estimate the generation of greenhouse gas ("GHG") emissions under various solid waste management scenarios. The WARM calculates GHG emissions for baseline and alternative waste management practices. The model calculates emissions in both metric tons of carbon equivalents ("MTCE") and metric tons of CO_2 equivalents ("$MTCO_2E$") across a wide range of material types found in municipal solid waste. The WARM also calculates energy use for each option.

As a part of Connecticut's Climate Change Action Plan, the Connecticut Bureau of Air Management is currently using the WARM to update a GHG inventory addressing emissions from waste disposal. The first inventory can be found at http://ctclimatechange.com/ct_inventory.html.

As a part of preparing Connecticut's solid waste management plan (the "Plan"), the US EPA's WARM version 7 (08/05) has been used to assess the environmental impact of alternative waste management practices in two areas. First, the WARM has been used to measure and compare the environmental effect of diverting 30 percent of the State's MSW from disposal with the effect of diverting 49 percent of the MSW from disposal. Second, the WARM has been used to assess the effect on emissions of increasing the RRF disposal capacity in Connecticut and decreasing the amount of MSW disposed in out-of-State landfills.

The WARM analysis involves developing three scenarios, each comparing two options. As pointed out in this discussion, some of the assumptions or conditions used in the scenarios may be open to criticism, for example due to information being taken from other states. It should be noted that these comparisons are for the purpose of evaluating the relative impacts of the different scenarios on greenhouse gas emissions, not for the purpose of supporting any specific strategies or recommendations of this Plan.

1. **Scenario 1** uses the WARM analytical inputs applied to the projected management of MSW for FY 2005 in the Plan. This scenario compares the FY 2005 projection of a 30 percent waste diversion rate with a 49 percent waste diversion rate. In both cases, Connecticut's current annual RRF disposal capacity of 2,209,000 tons is assumed with any remaining MSW disposed at out-of-state landfills.
2. **Scenario 2** compares two RRF disposal capacities with 30 percent waste diversion rate in FY 2024, using the MSW projections in the Plan. In the first case, RRF disposal capacity for MSW is assumed to be 2,066,000 tons with the remaining waste disposed in out-of-state landfills. In the second case, RRF disposal capacity is assumed to be increased by 614,000 tons per year which would eliminate the MSW disposal capacity shortfall in FY2024 when the State's MSW diversion rate reaches 49 percent (see Table 1 in Appendix J). With the addition of the 614,000 TPY of MSW disposal capacity, Connecticut's MSW RRF disposal capacity would

be 2,680,000 TPY. The effect of increasing the MSW RRF disposal capacity is to reduce Connecticut's reliance on out-of-State landfills.

3. **Scenario 3** compares a 30 percent waste diversion rate to a 49 percent diversion rate in FY 2024, using the MSW projections in the Plan. In addition, it is assumed that 614,000 tons of RRF capacity has been added to the State's existing 2,066,000 tons of RRF capacity, resulting in a total Connecticut RRF disposal capacity of 2,680,000 tons.

Scenario Development

As inputs, the WARM uses specific MSW material categories. Because Connecticut has not conducted a waste composition study, certain assumptions regarding the composition of the State's MSW had to be made in order to conform to the WARM format. These adjustments are explained below.

MSW Generation

As a first step in the WARM analysis, the model requires the user to quantify the amount of MSW in 33 material categories. That is, the user must indicate the number of tons of each material in the MSW that is generated, recycled, landfilled, combusted, and composted for all scenarios. The 33 material categories in the WARM are listed in Table I-6

Table I-6
Material Categories in WARM, Version 7

Material
Aluminum Cans
Steel Cans
Copper Wire
Glass
HDPE
LDPE
PET
Corrugated Cardboard
Magazines/Third Class Mail
Newspaper
Office Paper
Phone Books
Text Books
Dimension Lumber
Medium Density Fiberboard

Table I-6
Material Categories in WARM, Version 7

Food Scraps
Yard Trimmings
Grass
Leaves
Branches
Mixed Paper (General)
Mixed Paper (Residential)
Mixed Paper (primarily from offices)
Mixed Metals
Mixed Plastics
Mixed Recyclables
Mixed Organics
Mixed MSW
Carpet
Personal Computers
Clay Bricks
Aggregate
Fly Ash

In the absence of a waste composition study for Connecticut, it was necessary to develop a proxy (i.e. another study) which could be used to represent Connecticut's MSW stream. Selecting a proxy for Connecticut's MSW stream involved consideration of several issues, including:

- The date of the proxy study. Because changes in products and materials are constantly taking place, it is helpful to have a study that has been conducted recently to reflect the latest trends in materials. For example a 10 or 15 year-old study probably would not reflect the growth in electronic products which are now appearing the waste stream.
- A deposit container law. Connecticut's bottle bill affects the amount of glass, aluminum, and plastic in the MSW disposed. Ideally, a proxy study should be from a jurisdiction which also has a bottle bill.
- Regional climate influences. Connecticut experiences four distinct seasons which affect the amount of yard waste generated in the state. A proxy study should have a similar climactic profile. For example, a study from Florida or Arizona where the growing season is longer would probably include a greater percentage of yard waste than one would expect to find in Connecticut.

Because no single study could be found that captured the features of both Connecticut's residential MSW and commercial MSW, two proxy studies were chosen – one for the State's residential MSW stream and one for the State's commercial MSW stream.

To represent Connecticut's residential MSW stream, the recently completed New York City Waste Characterization Study (the "NYC Study") was selected. The part of the NYC Study to be used as a proxy characterized the entire New York City's residential MSW stream. Like Connecticut, New York State has a deposit container law and shares the same type of climatic conditions, although it is probable that New York City's urban environment generates less yard waste than Connecticut's mix of urban, suburban, and rural areas. The NYC Study does not include commercial waste.

To represent Connecticut's commercial MSW stream, the Pennsylvania State Waste Characterization Study (the "Pennsylvania Study") was selected. Completed in 2003, the section of the Pennsylvania Study to be used as a proxy for Connecticut's commercial MSW characterized Pennsylvania's commercial MSW stream. Pennsylvania has climate that is similar to Connecticut's climate. Pennsylvania does not have a container deposit law.

Finally, to develop a proxy of Connecticut's MSW for use in the WARM, it is assumed that 50 percent of the State's MSW was generated by residents and 50 percent is generated by commercial establishments. Table I-7 presents the estimated composition of tons of MSW generated in Connecticut, based on these proxy studies and the tons of MSW projected to be generated in Connecticut in FY 2005.

Table I-7
Composition of Connecticut Generated MSW Based on Proxy Studies (1)

Material	Total MSW Generated	Percent Generated
Paper	1,179,550	31.00%
Plastic	475,625	12.50%
Glass	123,663	3.25%
Metal	190,250	5.00%
Organics	1,160,525	30.50%
Electronics	76,100	2.00%
C&D	539,930	14.10%
Inorganics	49,465	1.30%
HHW	9,893	0.26%
TOTAL	3,805,000 (2)	

(1) The residential portion of the MSW is based on the 2006 New York City Waste Characterization Study and the commercial portion of the MSW is based on the estimate of commercial waste in the 2003 Pennsylvania Waste Characterization Study

(2) The Connecticut Solid Waste Management Plan estimates that 3,805,000 tons of MSW will be generated in FY 2005.

To apply the composition of Connecticut's MSW to the material categories in the WARM, it was necessary to sub-divide certain material groups shown in Table I-7. Table I-8 shows the way in which the "proxy" estimate of Connecticut's MSW was applied to 17 of the 33 WARM material categories.

Table I-8
Connecticut's MSW Using WARM Material Categories

WARM Material Categories	Tons Generated	Percent of Total
Newspaper	188,819	4.96%
Corrugated Cardboard	272,819	7.17%
Mixed Paper (General)	270,440	7.11%
Office Paper	90,635	2.38%
PET	38,815	1.02%
HDPE	25,695	0.68%
Mixed Plastics	411,115	10.80%
Glass	123,663	3.25%
Aluminum Cans	10,996	0.29%
Mixed Metals	179,254	4.71%
Yard Trimmings	78,370	2.06%
Grass	51,000	1.34%
Food Scraps	533,136	14.01%
Personal Computers (1)	76,100	2.00%
Mixed Organics	497,915	13.09%
Mixed Recyclables (2)	709,263	18.64%
Mixed MSW	246,877	6.49%
Total	3,805,000	100.00%

(1) Assumes all electronics in this category.
(2) Assumes all C&D materials in this category

These categories and amounts were used to develop the three scenarios in the WARM analysis.

Scenario 1

Scenario 1 compares two MSW diversion rates in FY 2005. The Plan estimates that in FY 2005 30 percent, or approximately 1,133,000 tons, of the MSW generated is diverted from disposal. Of this amount, approximately 24 percent is accounted for through reports to the CT DEP and an additional 6 percent was accounted for from materials recycled through the State's bottle bill and certain types of commercial recycling.

Because a proxy is being used to represent the composition of Connecticut's MSW, there are three anomalies which occur when Connecticut's diversion rates are applied to the proxy composition numbers. For three materials, the number of tons reported diverted by the CT DEP is greater than the number of tons generated, as estimated by the proxy studies.

- OCC: The number of tons of OCC diverted in FY2005, including an estimate of the tons of commercial OCC diverted, exceed the number of tons generated by approximately 119,000 tons.
- Aluminum Cans: The number of tons of aluminum cans diverted in FY2005, including aluminum cans captured by the bottle bill, exceed the number of tons aluminum cans generated by approximately 3,400 tons. Another possible explanation may be that since 1998, when the study on which the diversion figure for aluminum cans is based, the weight of an aluminum can has been significantly reduced.
- Yard Waste: The number of tons of yard waste diverted in FY2005, including home composting and grasscycling, exceeds the number of tons of yard waste generated by approximately 161,000 tons.

In each of these cases, it may be that the number of tons of the material in the proxy study is less than the actual number of tons of the material in Connecticut's MSW. For example, it is likely that the percentage of yard waste in New York City, which is more highly urbanized than Connecticut, is smaller than the percentage of yard waste in Connecticut. It may also be that the estimate of the number of tons diverted in Connecticut may be overstated, or it may be a combination of the two. These anomalies illustrate one difficulty with using proxies. Because these anomalies suggest that Connecticut is diverting a significant amount of these materials, it has been assumed, for the purposes of this analysis, that 90 percent of these three materials are diverted from disposal.

Of the 70 percent of MSW not diverted from disposal, approximately 2,671,000 tons, it is estimated that 2,209,000 tons are combusted in Connecticut's six RRFs and the remaining 462,000 tons are landfilled. For the purposes of this analysis, it is assumed that this waste will be transported out-of-state for disposal. Furthermore, it is assumed that each material is disposed in identical proportions, 83 percent to combustion and 17 percent to landfilling.

Table I-9 presents the 30-percent diversion case in Scenario 1.

Table I-9
Scenario 1 - FY 2005, 30 Percent Diversion

FY 2005 Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	188,918	136,166	9,126	43,626	---
Corrugated Cardboard	272,819	245,537	4,720	22,562	---
Mixed Paper	270,440	30,207	41,560	198,673	---
Office Paper	90,635	74,241	2,836	13,558	---
PET	38,815	14,515	4,2104	20,096	---
HDPE	25,695	7,889	3,080	14,726	---
Mixed Plastics	411,115	---	71,123	339,992	---
Glass	123,663	76,238	8,205	39,220	---
Aluminum Cans	10,996	9,896	190	909	---
Mixed Metals	179,254	94,556	14,653	70,045	---
Yard Trimmings	129,370	---	2,264	10,673	116,433
Food Scraps	533,136	---	92,648	439,809	679
Personal Computers	76,100	441	13,089	62,570	---
Mixed Organics	497,915	---	86,139	411,776	---
Mixed Recyclables	709,263	326,201	66,270	316,792	---
Mixed MSW	246,866	---	42,708	204,158	---
TOTAL (1)	3,805,000	1,015,888	462,814	2,209,186	117,112

(1) Figures may not add due to rounding

To estimate the reduction in emissions when the MSW diversion rate increases from 30 percent, as shown in Table I-9, to 49 percent, the following changes were assumed.

1. A more aggressive program to divert Mixed Paper from disposal is implemented, resulting in an increase in the amount of Mixed Paper recycled. On a percentage basis, the diversion rate for Mixed Paper increases from 11 percent to 40 percent.
2. An aggressive program to divert food waste from disposal is assumed to be implemented resulting in an increase in the amount of Food Scraps composted. On a percentage basis, the diversion rate for Food Scraps increases from less than 1 percent to 60 percent.
3. A program to divert electronics from disposal is assumed to be implemented resulting in an increase in the amount of electronics [Personal Computers] recycled. On a percentage basis, the diversion rate for electronics increases from less than 1 percent to 50 percent.
4. A program to divert C&D Materials from disposal is assumed to be implemented resulting in an increase in the amount of C&D Materials recycled. Because the WARM does not have a category for C&D Materials, it is assumed that these materials are included in the WARM's Mixed Recyclables category. On a

percentage basis, the diversion rate for C&D Materials increases from less than 1 percent to 60 percent. It should be noted that the C&D waste shown here are those C&D materials disposed with the MSW and do not include the large amount of C&D waste disposed from large construction projects.

5. It is further assumed that all other recycling and composting programs remain exactly as they are in the 30 percent case, including the 90 percent diversion rates for OCC, aluminum cans, and yard waste.

Together these assumptions result in an overall MSW diversion rate of 49 percent. These strategies are used for illustration and it should be emphasized that these assumptions do not necessarily represent the goals that Connecticut will adopt to reduce its waste. There are many possible options for diverting waste from disposal and selecting them will take time and careful planning.

A 49 percent diversion in FY 2005 would result in 1,864,496 tons of MSW diverted from disposal, leaving 1,940,504 tons of MSW remaining for disposal. With Connecticut's RRF disposal capacity at 2,209,000, this means that all remaining MSW could be disposed in the State's RRF facilities and none would need to be landfilled.

Table I-10 shows the details of Scenario 1 with a 49 percent diversion rate.

Table I-10
Scenario 1 – FY 2005, 49 Percent Diversion

Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	188,918	136,166	---	52,752	---
Corrugated Cardboard	272,819	245,537	---	27,282	---
Mixed Paper	270,440	162,264	---	108,176	---
Office Paper	90,635	74,241	---	16,394	---
PET	38,815	14,515	---	24,300	---
HDPE	25,695	7,889	---	17,806	---
Mixed Plastics	411,115	---	---	411,115	---
Glass	123,663	76,238	---	37,425	---
Aluminum Cans	10,996	9,896	---	1,100	---
Mixed Metals	179,254	94,556	---	84,698	---
Yard Trimmings	129,370	---	---	116,433	116,433
Food Scraps	533,136	---	---	213,254	319,881
Personal Computers	76,100	38,050	---	38,050	---
Mixed Organics	497,915	---	---	497,915	---
Mixed Recyclables	709,263	598,829	---	140,434	
Mixed MSW	246,866	---	---	246,866	---
TOTAL (1)	3,805,000	1,428,181	---	1,940,504	436,315

(1) Figures may not add due to rounding.

Based on the CT DEP estimates for FY2003 grasscycling and home composting were projected to account for approximately 51,000 tons of yard trimmings being diverted from disposal in FY2005. Therefore, in the analysis, it is assumed that these 51,000 tons of yard trimmings are composted.

The results of Scenario 1 rest on the following assumptions which are included in the WARM:

- The emissions from landfilling depend, in part, on whether or not the landfill has a landfill gas control system. Although the types of landfill gas control systems in the landfills accepting Connecticut's MSW are varied, the analysis assumes that all landfills have some type of landfill gas control system.
- The analysis also assumes that landfill gas captured by the landfill gas control systems are flared, rather than captured for energy.
- Because the efficiencies of the landfill gas control systems used in all landfills that are accepting Connecticut MSW are not known, the WARM's default value of 75 percent efficiency is assumed.

- Emissions that occur during the transport of materials to the management facility are included in the WARM. These emissions occur when materials are transported by truck to an IPC, a composting site, an RRF, or a landfill. The analysis assumes that materials that are being recycled, composted, or combusted are moved within Connecticut and the average transportation distance, from the point of generation to the management facility, is 50 miles. On the other hand, when MSW is transported to out-of-state landfills for disposal, it is assumed that the average transportation distance is 300 miles. It should also be noted that in addition to the air emissions, there would also be GHG emissions.

Based on the assumptions above, the results of Scenario 1 are as follows:

MTCE: In the 30 percent diversion case, there is a reduction of approximately 962,638 metric tons of carbon equivalents. For the 49 percent diversion rate, the reduction is 1,237,463 metric tons of carbon equivalents. In other words, when the diversion rate in FY 2005 is increased from 30 percent to 49 percent, there is a reduction of the equivalent of 274,825 metric tons of carbon.

MTCO$_2$E: In the 30 percent diversion case, there is a reduction of approximately 3,529,674 metric tons of CO_2 equivalents. For the 49 percent diversion rate, the reduction is 4,537,366 metric tons of CO_2 equivalents. In other words, when the diversion rate in FY 2005 is increased from 30 percent to 49 percent, there is a reduction of the equivalent of 1,007,691 metric tons of CO_2

The WARM model also estimates that increasing the diversion rate from 30 percent to 49 percent in FY 2005 is the equivalent of removing 218,115 passenger cars from the road each year.

Scenario 2

Scenario 2 uses the same assumptions as Scenario 1, with two exceptions. First, Scenario 2 uses the Plan's MSW projections for FY 2024. Because of the projected growth in Connecticut's population, economic growth, and per capita waste generation, the amount of MSW generated is projected to increase from approximately 3,805,000 tons in FY 2005 to approximately 5,233,000 tons in FY 2024. Second, Scenario 2 includes two different disposal cases. In the first case, it is assumed that Connecticut's RRF disposal capacity in FY 2024 remains at the FY 2010 level of 2,066,000 tons per year. In the second case, it is assumed that an additional 614,000 tons of RRF disposal capacity is added, resulting in a total RRF disposal capacity in FY 2024 of 2,680,000 tons per year.

Table I-11 presents the 30 percent diversion case for FY 2024, assuming no new RRF disposal capacity.

Table I-11
Scenario 2 – FY 2024, 30 Percent Diversion with 2,066,000 of RRF Disposal Capacity

FY 2024 Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	259,818	187,269	31,631	40,918	---
Corrugated Cardboard	375,207	337,686	16,359	21,162	---
Mixed Paper	371,935	41,544	144,051	186,341	---
Office Paper	124,650	102,103	9,830	12,716	---
PET	53,382	19,962	14,571	18,849	---
HDPE	35,338	10,850	10,677	13,812	---
Mixed Plastics	565,405	---	246,516	318,888	---
Glass	170,073	104,850	28,437	36,786	---
Aluminum Cans	15,123	13,610	659	853	---
Mixed Metals	246,527	130,042	50,787	65,697	---
Yard Trimmings	177,922	---	7,829	9,964	160,130
Food Scraps	733,220	---	322,206	410,080	934
Personal Computers	104,660	607	45,471	58,582	---
Mixed Organics	684,780	---	298,564	386,216	---
Mixed Recyclables	975,446	448,623	231,802	295,021	---
Mixed MSW	339,514	---	149,386	190,128	---
TOTAL (1)	5,233,000	1,397,146	1,608,778	2,066,012	161,064

(1) Figures may not add due to rounding

As Table I-11 shows, 31 percent of MSW generated in FY 2024 is disposed in out-of-state landfills.

Table I-12 presents the 30 percent diversion case for FY 2024, assuming RRF disposal capacity increases from approximately 2,066,000 tons per year to 2,680,000 tons per year.

Table I-12
Scenario 2 - FY 2024, 30 Percent Diversion with 2,680,000 of RRF Disposal Capacity

FY 2024 Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	259,818	187,269	19,951	52,598	---
Corrugated Cardboard	375,207	337,686	10,318	27,202	---
Mixed Paper	371,935	41,544	90,858	239,534	---
Office Paper	124,650	102,103	6,200	16,346	---
PET	53,382	19,962	9,190	24,229	---
HDPE	35,338	10,850	6,612	17,877	---
Mixed Plastics	565,405	---	152,659	412,745	---
Glass	170,073	104,850	17,610	47,613	---
Aluminum Cans	15,123	13,610	416	1,098	---
Mixed Metals	246,527	130,042	31,451	85,034	---
Yard Trimmings	177,922	---	4,893	12,899	160,130
Food Scraps	733,220	---	197,717	534,569	934
Personal Computers	104,660	607	28,094	75,959	---
Mixed Organics	684,780	---	184,891	499,890	---
Mixed Recyclables	975,446	448,623	142,242	384,581	---
Mixed MSW	339,514	---	91,669	247,845	---
TOTAL [1]	5,233,000	1,397,146	994,772	2,680,018	161,064

(1) Figures may not add due to rounding.

When RRF disposal capacity is increased, the percentage of MSW being landfilled decreases from 31 percent to 19 percent.

Based on the assumptions above, the results of Scenario 2 are as follows:

MTCE: In the case with no new RRF capacity, there is a reduction in emissions of approximately 1,289,764 metric tons of carbon equivalents. When the additional 614,000 tons of RRF disposal capacity is added, the reduction in emissions is approximately 1,308,672 metric tons of carbon equivalents. In other words, when the amount of MSW disposed in RRFs increases, there is a emissions reduction of the equivalent of 18,908 metric tons of carbon.

MTCO$_2$E: In the case with no new RRF capacity, there is a reduction in emissions of approximately 4,729,135 metric tons of CO_2 equivalents. When the additional RRF capacity is added and less MSW is landfilled, the reduction of emissions is 4,798,443 metric tons of CO_2 equivalents. In other words, when the amount of MSW disposed in RRFs increases and the amount landfilled out-of-state decreases, there is a reduction of the equivalent of 69,329 metric tons of CO_2

The WARM model estimates that increasing RRF disposal capacity from 2,066,000 tons per year to 2,680,000 tons per year in FY 2024 is the equivalent of removing 15,006 passenger cars from the road each year.

Scenario 3

Scenario 3 presents a 30 percent diversion case and a 49 percent diversion case in FY 2024. In this scenario, it is also assumed that Connecticut's RRF capacity in FY 2024 is increased by 614,000 tons. As in Scenario 2, in FY 2024, the State's annual RRF disposal Capacity with this added capacity is assumed to be 2,680,000 tons which eliminates any disposal capacity shortfall in FY 2024 with a 49 percent diversion rate.

All other assumptions used in Scenarios 1 and 2 are used in Scenario 3.

Table I-13 presents the 30 percent diversion case for FY 2024, assuming an RRF disposal capacity of 2,680,000 tons.

Table I-13
Scenario 3 - FY 2024, 30 Percent Diversion with RRF Capacity of 2,680,000 tons

FY 2024 Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	259,818	187,269	19,951	52,598	---
Corrugated Cardboard	375,207	337,686	10,318	27,202	---
Mixed Paper	371,935	41,544	90,858	239,534	---
Office Paper	124,650	102,103	6,200	16,346	---
PET	53,382	19,962	9,190	24,229	---
HDPE	35,338	10,850	6,612	17,877	---
Mixed Plastics	565,405	---	152,659	412,745	---
Glass	170,073	104,850	17,610	47,613	---
Aluminum Cans	15,123	13,610	416	1,098	---
Mixed Metals	246,527	130,042	31,451	85,034	---
Yard Trimmings	177,922	---	4,893	12,899	160,130
Food Scraps	733,220	---	197,717	534,569	934
Personal Computers	104,660	607	28,094	75,959	---
Mixed Organics	684,780	---	184,891	499,890	---
Mixed Recyclables	975,446	448,623	142,242	384,581	---
Mixed MSW	339,514	---	91,669	247,845	---
TOTAL (1)	5,233,000	1,397,146	994,772	2,680,018	161,064

(1) Figures may not add due to rounding.

Table I-14 presents the 49 percent diversion case for FY 2024, assuming an RRF disposal capacity of 2,680,000 tons.

Table I-14
Scenario 3 - FY 2024, 49 Percent Diversion with RRF Capacity of 2,680,000 tons

FY 2024 Material	Tons Generated	Tons Recycled	Tons Landfilled	Tons Combusted	Tons Composted
Newspaper	259,818	187,269	---	72,550	---
Corrugated Cardboard	375,207	337,686	---	37,521	---
Mixed Paper	371,935	148,744	---	223,161	---
Office Paper	124,650	102,103	---	22,547	---
PET	53,382	19,962	---	33,420	---
HDPE	35,338	10,850	---	24,489	---
Mixed Plastics	565,405	---	---	565,405	---
Glass	170,073	104,850	---	65,223	---
Aluminum Cans	15,123	13,610	---	1,512	---
Mixed Metals	246,527	130,042	---	116,485	---
Yard Trimmings	177,922	---	---	17,792	160,130
Food Scraps	733,220	---	---	293,288	439,932
Personal Computers	104,660	52,330	---	52,330	---
Mixed Organics	684,780	---	---	684,780	---
Mixed Recyclables	975,446	845,517	---	129,929	---
Mixed MSW	339,514	---	---	339,514	---
TOTAL [1]	5,233,000	1,952,994	---	2,679,945	600,062

(1) Figures may not add due to rounding.

As Table I-14 shows, no MSW is landfilled with a 49 percent diversion rate in FY 2024.

Based on the assumptions above, the results of Scenario 3 are as follows:

MTCE: In the 30 percent diversion case, there is a reduction of approximately 1,308,672 metric tons of carbon equivalents. For the 49 percent diversion rate, the reduction is 1,689,784 metric tons of carbon equivalents. In other words, when the diversion rate in FY 2024 is increased from 30 percent to 49 percent and RRF disposal capacity is increased, there is an emissions reduction of the equivalent of 381,112 metric tons of carbon.

MTCO$_2$E: In the 30 percent diversion case, there is a reduction of approximately 4,798,463 metric tons of CO_2 equivalents. For the 49 percent diversion rate, the reduction is 6,195,874 metric tons of CO_2 equivalents. In other words, when the diversion rate in FY 2024 is increased from 30 percent to 49 percent, there is a reduction of the equivalent of 1,397,410 metric tons of CO_2

The WARM model estimates that increasing the diversion rate in FY 2024 from 30 percent to 49 percent, with an RRF disposal capacity of 2,680,0000 tons per year is the equivalent of removing 302,470 passenger cars from the road each year.

WARM Summary

Table I-15 summarizes the results of the three scenarios developed with the WARM, based on the assumptions described above.

Table I-15
Summary of WARM Analysis

Scenario	MSW Diverted (%)	MSW Landfilled (%)	MSW Combusted (%)	MTCE	$MTCO_2E$
Scenario 1 (1)	30%	12%	58%	(962,638)	(3,529,674)
Scenario 1 (1)	49%	0%	51%	(1,237,463)	(4,537,366)
Scenario 2 (2)	30%	31%	39%	(1,289,674)	(4,729,135)
Scenario 2 (3)	30%	19%	51%	(1,308,672	(4,798,463)
Scenario 3 (4)	30%	19%	51%	(1,308,672)	(4,798,463)
Scenario 3 (4)	49%	0%	51%	(1,689,784)	(6,195,874)

(1) FY2005, assumes MSW generation of 3,805,000 TPY and an RRF disposal capacity of 2,290,000 tons.
(2) FY2024, assumes MSW generation 5,233,000 TPY and an RRF disposal capacity of 2,066,000 tons.
(3) FY2024, assumes MSW generation of 5,233,000 TPY and an RRF disposal capacity of 2,680,000 tons.
(4) FY2024, assumes MSW generation of 5,233,000 TPY and an RRF disposal capacity of 2,680,000 tons.

As both Scenarios 1 and 3 show that the greatest reductions in emissions occur at the 49 percent diversion rates. Scenario 2 indicates that there is a reduction in emissions when MSW is disposed in Connecticut RRFs, rather than being disposed in out-of-state landfills.

Appendix J
PROJECTIONS OF SOLID WASTE GENERATION AND DISPOSAL

Introduction

Appendix J presents a summary of the projections, for the period from FY2005 through FY2024, of Connecticut solid waste: generation, diversion from disposal, disposal, and in-state disposal capacity, and provided the basis for Connecticut's solid waste management Plan (the "Plan").

Projections, were developed by R. W. Beck, Inc. (consultants hired by the CT DEP to assist in the update of the Plan) and were based on a combination of solid waste data reported to the CT DEP; estimates of data not captured by the reporting system; and the development and use of a regression analysis based on Connecticut's population and the Gross State Product, resulting in assumptions of a 1.6 percent annual increase for some components of the solid waste stream. Additional assumptions are presented in footnotes accompanying each table. These projections are presented in seven tables and three figures which are briefly described below.

Table J-1

MSW Projections – Assuming an MSW Diversion Rate of 49% by 2024

This table shows the projected generation and disposal of municipal solid waste ("MSW") over the 20 year planning period, assuming that Connecticut's waste diversion rate increases from 30 percent in FY2005 to 49 percent in FY2024 in order to maintain a consistent annual tonnage of MSW disposed from FY2005 through FY2024 (i.e., approximately 2.7 million tons/year). Based on the assumptions used in the projections, Connecticut's in-state disposal capacity shortfall in Table J-1 is 614,000 tons in FY2024. To completely eliminate the projected in-state disposal capacity shortfall projected for FY2024 Connecticut would need to divert 3,167,000 tons of MSW from disposal, which would mean achieving an MSW recycling/source reduction rate of 61 percent.

Table J-2

MSW Projections – Assuming an MSW Diversion Rate of 40% by 2015 through 2024

This table shows the projected generation and disposal of MSW over the 20 year planning period, assuming that Connecticut's waste diversion rate increases from 30 percent in FY2005 to 40 percent in FY2015 and remains at 40 percent through

FY2024. Based on the assumptions used in the projections, Connecticut's in-state disposal capacity shortfall in Table J-2 is 1,074,000 tons in FY2024.

Table J-3

MSW Projections – Assuming the MSW Diversion Rate Remains at 30% through 2024

This table shows the projected generation and disposal of MSW over the 20 year planning period, assuming that Connecticut's waste diversion rate remains at 30 percent from FY2005 through FY2024. Based on the assumptions used in the projections, Connecticut's in-state disposal capacity shortfall in Table J-3 is 1,597,000 tons in FY2024.

Figure J-1

Projections of In-State MSW Disposal Capacity Shortfall

Figure J-1 illustrates the projected in-state disposal capacity shortfall from FY2005 through FY2024 under the three waste diversion assumptions shown in Tables J-1, 2, and 3.

Table J-4

RRF Ash Residue Generation Projections

This table shows the projected generation and disposal of RRF ash residue over the 20 year planning period, assuming that no new in-state RRF processing capacity is developed. Based on the assumptions used in these projections, Connecticut's in-state RRF ash residue disposal capacity shortfall in Table J-4 is 504,000 tons in FY2024.

Figure J-2

Projections of In-State MSW RRF Ash Residue Disposal Capacity Shortfall

Figure J-2 illustrates the projected in-state disposal capacity shortfall for RRF ash residue from FY2005 through FY2024, as presented in Table J-4.

Table J-5

Construction and Demolition (C&D) Waste/Oversized MSW Projections Assuming a Disposal Diversion Rate of 48% by 2024)

This table shows the projected generation and disposal of construction and demolition waste ("C&D Waste) and oversized MSW over the 20 year planning period, assuming that Connecticut's C&D Waste diversion from disposal rate increases from 7 percent

in FY2005 to 48 percent in FY2024. Based on the assumptions used in these projections, Connecticut's C&D Waste/Oversized MSW disposal capacity shortfall in Table J-5 is 801,000 tons in FY2024.

Table J-6

Construction and Demolition (C&D) Waste/Oversized MSW Projections Assuming a Disposal Diversion Rate of 40% by 2014 through 2024)

This table shows the projected generation and disposal of C&D Waste/Oversized MSW over the 20 year planning period, assuming that Connecticut's C&D Waste diversion rate increases from 7 percent in FY2005 to 40 percent in FY2014 and remains at 40 percent through FY2024. Based on the assumptions used in these projections, Connecticut's C&D Waste/Oversized MSW disposal capacity shortfall in Table J-6 is 925,000 tons in FY2024.

Table J-7

Construction and Demolition (C&D) Waste/Oversized MSW Projections Assuming a Disposal Diversion Rate Remains at 7% through 2024)

This table shows the projected generation and disposal of C&D Waste/Oversized MSW over the 20 year planning period, assuming that Connecticut's C&D Waste diversion rate remains at 7 percent from FY2005 through FY2024. Based on the assumptions used in these projections, Connecticut's C&D Waste/Oversized MSW disposal capacity shortfall in Table J-7 is 1,436,000 tons in FY2024.

Figure J-3

Projections of In-State C&D Waste/Oversized MSW Disposal Capacity Shortfall

Figure J-3 illustrates the projected in-state C&D Waste/Oversized MSW disposal capacity shortfall from FY2005 through FY2024 under the three waste diversion assumptions shown in Tables J-5, 6, and 7.

Table J-1
CT Municipal Solid Waste (MSW) Projections and In-State MSW Disposal Capacity Projections, 2005-2024
(Assumes MSW Diversion Rate of 49% by 2024)

FY = July previous year through June of years listed	Fiscal Year	MSW Generated (1) (000 TPY) (2)	Percent MSW Diverted from Disposal (3)	MSW Diverted from Disposal (000 TPY)	MSW Disposed (000 TPY)	In-State Disposal Capacity (000 TPY) (4)	In-State Disposal Capacity Shortfall (5) (000 TPY)
July '04 - June '05	2005	3,805	30%	1,133	2,671	2,344	327
July '05 - June '06	2006	3,865	31%	1,190	2,675	2,344	331
July '06 - June '07	2007 (6)	3,926	32%	1,248	2,678	2,260	418
July '07 - June '08	2008 (7)	3,988	33%	1,308	2,681	2,235	446
July '08 - June '09	2009	4,052	34%	1,369	2,683	2,209	474
July '09 - June '10	2010 (8)	4,118	35%	1,432	2,685	2,066	619
July '10 - June '11	2011	4,186	36%	1,498	2,688	2,066	622
July '11 - June '12	2012	4,257	37%	1,566	2,691	2,066	625
July '12 - June '13	2013	4,328	38%	1,636	2,693	2,066	627
July '13 - June '14	2014	4,402	39%	1,707	2,694	2,066	628
July '14 - June '15	2015	4,476	40%	1,781	2,695	2,066	629
July '15 - June '16	2016	4,553	41%	1,857	2,696	2,066	630
July '16 - June '17	2017	4,632	42%	1,936	2,696	2,066	630
July '17 - June '18	2018	4,712	43%	2,016	2,696	2,066	630
July '18 - June '19	2019	4,794	44%	2,099	2,695	2,066	629
July '19 - June '20	2020	4,879	45%	2,185	2,694	2,066	628
July '20 - June '21	2021	4,965	46%	2,273	2,691	2,066	625
July '21 - June '22	2022	5,052	47%	2,364	2,688	2,066	622
July '22 - June '23	2023	5,142	48%	2,457	2,685	2,066	619
July '23 - June '24	2024	5,233	49%	2,553	2,680	2,066	614

(1) MSW generation projections based on projections of Connecticut's population from US Census Bureau and the Gross State Product .

(2) TPY is defined as Tons per Year

(3) The percent of MSW diverted from disposal = the amount of MSW recycled and composted divided by the amount of MSW generated. For FY2005, the 30% diversion rate was calculated based on reported and estimated amounts of material recycled and composted; the estimated amounts included additional commercial recycling (not reported) and estimates of bottle bill material recycled.

(4) In-State MSW Disposal Capacity = In-State Landfill Capacity (based on amount of MSW disposed in FY2004) plus In-State Resource Recovery Facility capacity (based on the five-year average processed at CT RRFs FY2000-FY2004) assuming no new disposal capacity is added.

(5) In-State Disposal Capacity Shortfall = MSW disposed minus In-State Disposal Capacity

(6) Hartford Landfill closes in June 2006 resulting in a reduction of 84 (000) TPY of MSW (process residue) starting in 2007

(7) Windsor-Bloomfield Landfill closes in December 2007 resulting in a reduction of 26 (000) tons of MSW disposal capacity starting in FY 2008 and no disposal capacity for this landfill thereafter.

(8) For planning purposes Wallingford RRF is assumed to close in June 2009 resulting in a reduction of 143 (000) TPY of MSW processing capacity. To date, no decision has been made regarding the Wallingford RRF and it may remain open beyond 2009

Table J-2
CT Municipal Solid Waste (MSW) Projections and In-State MSW Disposal Capacity Projections, 2005-2024
(Assumes MSW Diversion Rate of 40% by 2015 and maintains at this level to 2024)

FY = July previous year through June of years listed	Fiscal Year	MSW Generated [1] (000 TPY) [2]	Percent MSW Diverted from Disposal [3]	MSW Diverted from Disposal (000 TPY)	MSW Disposed (000 TPY)	In-State Disposal Capacity (000 TPY) [4]	In-State Disposal Capacity Shortfall (000 TPY) [5]
July '04 - June '05	2005	3,805	30%	1,133	2,671	2,344	327
July '05 - June '06	2006	3,865	31%	1,190	2,675	2,344	331
July '06 - June '07	2007 [6]	3,926	32%	1,248	2,678	2,260	418
July '07 - June '08	2008 [7]	3,988	33%	1,308	2,681	2,235	446
July '08 - June '09	2009	4,052	34%	1,369	2,683	2,209	474
July '09 - June '10	2010 [8]	4,118	35%	1,432	2,685	2,066	619
July '10 - June '11	2011	4,186	36%	1,498	2,688	2,066	622
July '11 - June '12	2012	4,257	37%	1,566	2,691	2,066	625
July '12 - June '13	2013	4,328	38%	1,636	2,693	2,066	627
July '13 - June '14	2014	4,402	39%	1,707	2,694	2,066	628
July '14 - June '15	2015	4,476	40%	1,781	2,695	2,066	629
July '15 - June '16	2016	4,553	40%	1,821	2,732	2,066	666
July '16 - June '17	2017	4,632	40%	1,853	2,779	2,066	713
July '17 - June '18	2018	4,712	40%	1,885	2,827	2,066	761
July '18 - June '19	2019	4,794	40%	1,918	2,877	2,066	811
July '19 - June '20	2020	4,879	40%	1,951	2,927	2,066	861
July '20 - June '21	2021	4,965	40%	1,986	2,979	2,066	913
July '21 - June '22	2022	5,052	40%	2,021	3,031	2,066	965
July '22 - June '23	2023	5,142	40%	2,057	3,085	2,066	1,019
July '23 - June '24	2024	5,233	40%	2,093	3,140	2,066	1,074

(1) MSW generation projections based on projections of Connecticut's population from US Census Bureau and the Gross State Product .

(2) TPY is defined as Tons per Year.

(3) The percent of MSW diverted from disposal = the amount of MSW recycled and composted divided by the amount of MSW generated. For FY2005, the 30% diversion rate was calculated based on reported and estimated amounts of material recycled and composted; the estimated amounts included additional commercial recycling (not reported) and estimates of bottle bill material recycled.

(4) In-State MSW Disposal Capacity = In-State Landfill Capacity (based on amount of MSW disposed in FY2004) plus In-State Resource Recovery Facility capacity (based on the five-year average processed at CT RRFs FY2000-FY2004) assuming no new disposal capacity is added.

(5) In-State Disposal Capacity Shortfall = MSW disposed minus In-State Disposal Capacity

(6) Hartford Landfill closes in June 2006 resulting in a reduction of 84 (000) TPY of MSW (process residue) starting in 2007

(7) Windsor-Bloomfield Landfill closes in December 2007 resulting in a reduction of 26 (000) tons of MSW disposal capacity starting in FY 2008 and no disposal capacity for this landfill thereafter.

(8) For planning purposes Wallingford RRF is assumed to close in June 2009 resulting in a reduction of 143 (000) TPY of MSW processing capacity. To date, no decision has been made regarding the Wallingford RRF and it may remain open beyond 2009

Table J-3
CT Municipal Solid Waste (MSW) Projections and In-State MSW Disposal Capacity Projections, 2005-2024
(Assumes MSW Diversion Rate of 30% beginning in 2005 and remains at this level to 2024)

FY = July previous year through June of years listed	Fiscal Year	MSW Generated [1] (000 TPY) [2]	Percent MSW Diverted from Disposal [3]	MSW Diverted from Disposal (000 TPY)	MSW Disposed (000 TPY)	In-State Disposal Capacity (000 TPY) [4]	In-State Disposal Capacity Shortfall (000 TPY) [5]
July '04 - June '05	2005	3,805	30%	1,133	2,671	2,344	327
July '05 - June '06	2006	3,865	30%	1,159	2,705	2,344	361
July '06 - June '07	2007 [6]	3,926	30%	1,178	2,748	2,260	488
July '07 - June '08	2008 [7]	3,988	30%	1,197	2,792	2,235	557
July '08 - June '09	2009	4,052	30%	1,216	2,837	2,209	628
July '09 - June '10	2010 [8]	4,118	30%	1,235	2,882	2,066	816
July '10 - June '11	2011	4,186	30%	1,256	2,930	2,066	864
July '11 - June '12	2012	4,257	30%	1,277	2,980	2,066	914
July '12 - June '13	2013	4,328	30%	1,299	3,030	2,066	964
July '13 - June '14	2014	4,402	30%	1,320	3,081	2,066	1,015
July '14 - June '15	2015	4,476	30%	1,343	3,133	2,066	1,067
July '15 - June '16	2016	4,553	30%	1,366	3,187	2,066	1,121
July '16 - June '17	2017	4,632	30%	1,390	3,242	2,066	1,176
July '17 - June '18	2018	4,712	30%	1,414	3,299	2,066	1,233
July '18 - June '19	2019	4,794	30%	1,438	3,356	2,066	1,290
July '19 - June '20	2020	4,879	30%	1,464	3,415	2,066	1,349
July '20 - June '21	2021	4,965	30%	1,489	3,475	2,066	1,409
July '21 - June '22	2022	5,052	30%	1,516	3,537	2,066	1,471
July '22 - June '23	2023	5,142	30%	1,543	3,599	2,066	1,533
July '23 - June '24	2024	5,233	30%	1,570	3,663	2,066	1,597

(1) MSW generation projections based on projections of Connecticut's population from US Census Bureau and the Gross State Product .

(2) TPY is defined as Tons per Year

(3) The percent of MSW diverted from disposal = the amount of MSW recycled and composted divided by the amount of MSW generated. For FY2005, the 30% diversion rate was calculated based on reported and estimated amounts of material recycled and composted; the estimated amounts included additional commercial recycling (not reported) and estimates of bottle bill material recycled.

(4) In-State MSW Disposal Capacity = In-State Landfill Capacity (based on amount of MSW disposed in FY2004) plus In-State Resource Recovery Facility capacity (based on the five-year average processed at CT RRFs FY2000-FY2004) assuming no new disposal capacity is added.

(5) In-State Disposal Capacity Shortfall = MSW disposed minus In-State Disposal Capacity

(6) Hartford Landfill closes in June 2006 resulting in a reduction of 84 (000) TPY of MSW (process residue) starting in 2007

(7) Windsor-Bloomfield Landfill closes in December 2007 resulting in a reduction of 26 (000) tons of MSW disposal capacity starting in FY 2008 and no disposal capacity for this landfill thereafter.

(8) For planning purposes Wallingford RRF is assumed to close in June 2009 resulting in a reduction of 143 (000) TPY of MSW processing capacity. To date, no decision has been made regarding the Wallingford RRF and it may remain open beyond 2009

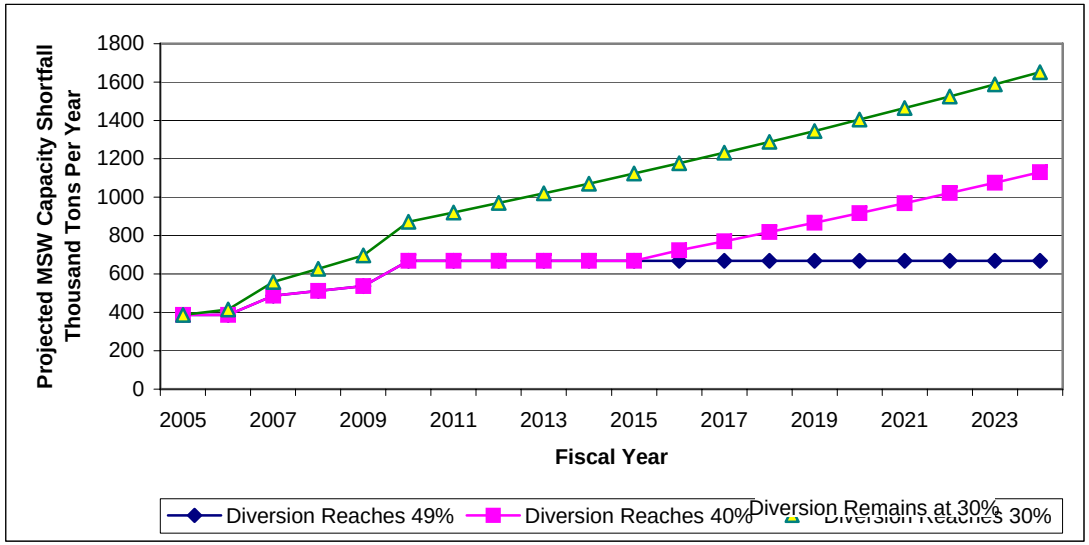


Figure J-1
Projections of In-State MSW Disposal Capacity Shortfall Under Various
Waste Diversion Assumptions for the Period FY2005 through FY2024

Table J-4
Projections of CT Resources Recovery Facility (RRF) Ash Residue Generation and In-State RRF Ash Residue Disposal Capacity, 2005-2024
(Assumes No New In-State RRF Processing Capacity Developed)

FY = July previous year through June of years listed	Fiscal Year	Total Projected Remaining In-State RRF Ash Disposal Capacity (1) (000 Tons)	MSW Processed (burned) at CT RRFs (000 TPY)	Total RRF Ash Residue Requiring Disposal (2) (000 TPY)	CT RRF Ash Residue Assumed To Be Disposed In-State (000 TPY)	Annual RRF Ash Residue Disposal Capacity Shortfall (000 TPY)
July '04 - June '05	2005	7,501	2,209 3	551	506	0
July '05 - June '06	2006	6,995	2,209	551	506	0
July '06 - June '07	2007	6,490	2,209	551	506	0
July '07 - June '08	2008 (4)	5,984	2,209	551	506	0
July '08 - June '09	2009 (5)	5,479	2,209	551	551	0
July '09 - June '10	2010 (6)	4,928	2,066	504	504	0
July '10 - June '11	2011	4,424	2,066	504	504	0
July '11 - June '12	2012	3,919	2,066	504	504	0
July '12 - June '13	2013	3,415	2,066	504	504	0
July '13 - June '14	2014	2,910	2,066	504	504	0
July '14 - June '15	2015	2,406	2,066	504	504	0
July '15 - June '16	2016	1,901	2,066	504	504	0
July '16 - June '17	2017	1,397	2,066	504	504	0
July '17 - June '18	2018	892	2,066	504	504	0
July '18 - June '19	2019	388	2,066	504	388	116
July '19 - June '207	2020	0	2,066	504	0	504
July '20 - June '21	2021	0	2,066	504	0	504
July '21 - June '22	2022	0	2,066	504	0	504
July '22 - June '23	2023	0	2,066	504	0	504
July '23 - June '24	2024	0	2,066	504	0	504

(1) In-State RRF Ash Disposal sites are the Hartford Landfill (CRRA) and the Putnam Ash Landfill (Wheelabrator Putnam, Inc)
(2) Assumes ash generation rate reflects average MSW RRF ash generation requiring disposal per year based on the period FY2000-FY2004.
(3) Based on five-year average of waste burned at In-State RRFs for the period (fiscal years) 2000 through 2004.
(4) Assumes that ash disposal capacity at the Hartford Landfill will be available to dispose of RRF from Mid-CT until October 2008.
(5) Assumes that Bristol's RRF ash is disposed In-State after its current contract with Seneca Meadows landfill in NY expires in June 2008.
(6) For planning purposes Wallingford RRF is assumed to close in June 2009, resulting in a reduction of 46,056 TPY of MSW RRF ash residue disposed annually based on the period FY2000-FY2004. To date no decision has been made regarding the Wallingford RRF and it may remain open beyond 2009.

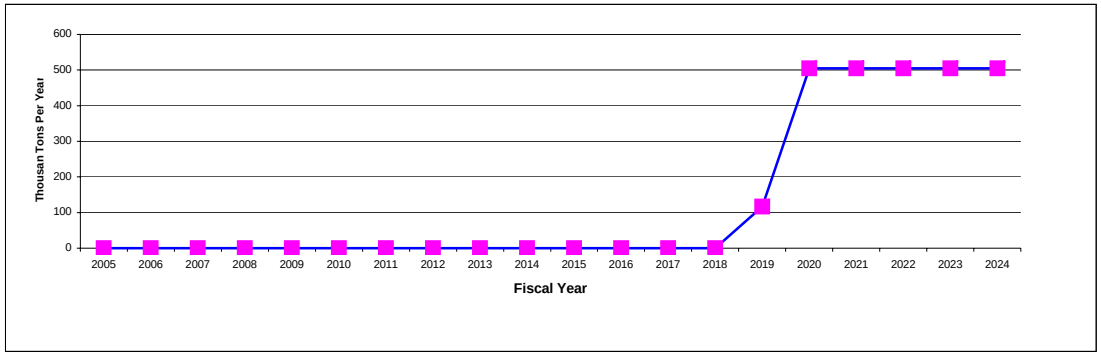


Figure J-2
Projections of In-State MSW RRF Ash Residue Disposal Capacity Shortfall for the Period FY2005 through FY2024

Table J-5
CT Construction and Demolition (C&D) Waste/Oversized MSW (1) (2) Projections and In-State Disposal Capacity Projections, 2005-2024
(Assumes C&D Diversion Rate of 48% by 2024)

FY = July previous year through June of years listed	Fiscal Year	C&D/Oversized MSW Processed or Disposed by CT Solid Waste Facilities (000 TPY) (3)	Percent C&D/Oversized MSW Diverted from Disposal (4)	C&D/Oversized MSW Disposed (000 TPY) (5)	Estimated In-State Disposal Capacity (000 TPY) (6)	C&D/Oversized MSW In-State Disposal Capacity Shortfall (000 TPY) (7)
July '04 - June '05	2005	1,145	7%	1,066	126	940
July '05 - June '06	2006	1,163	10%	1,047	128	919
July '06 - June '07	2007 (8)	1,182	15%	1,005	103	902
July '07 - June '08	2008	1,201	20%	961	104	856
July '08 - June '09	2009 (9)	1,220	25%	915	86	829
July '09 - June '10	2010	1,240	35%	806	67	738
July '10 - June '11	2011	1,259	36%	806	68	738
July '11 - June '12	2012	1,280	37%	806	69	737
July '12 - June '13	2013	1,300	38%	806	71	735
July '13 - June '14	2014	1,321	39%	806	72	734
July '14 - June '15	2015	1,342	40%	805	73	732
July '15 - June '16	2016	1,363	41%	804	74	730
July '16 - June '17	2017	1,385	42%	803	75	728
July '17 - June '18	2018	1,407	43%	802	76	726
July '18 - June '19	2019	1,430	44%	801	78	723
July '19 - June '20	2020	1,453	45%	799	79	720
July '20 - June '21	2021	1,476	46%	797	80	717
July '21 - June '22	2022	1,500	47%	795	81	713
July '22 - June '23	2023 (10)	1,524	48%	792	4	788
July '23 - June '24	2024	1,548	48%	805	4	801

(1) "Oversized MSW" is not consistently reported; sometimes it is reported as "bulky" or C&D waste (included in this table); sometimes it is reported as MSW (included in tables presenting CT MSW figures); CT definition for bulky waste and MSW contribute to this confusion.

(2) The figures presented in this table are based on C&D and "bulky waste" data reported by CT C&D volume reduction facilities (VRFs), CT transfer stations (TSs), CT Dept. of Transportation and CT landfills (LFs). This table does not include figures regarding clean wood reported recycled by CT recycling facilities or by CT municipalities. Figures reported for FY2004 have been escalated 1.6% to arrive at FY2005 estimates.

(3) C&D projections based on FY2004 C&D and "bulky waste" data reported to DEP (see footnote #1) and assumes a 1.6% annual increase in the amount of such waste generated.

(4) The 7% diversion (recycling) rate is the CT current C&D diversion rate as calculated from data submitted to the CT DEP as described in footnote #2.

(5) Disposed both in-state and out-of-state

(6) In-State disposal includes current landfill capacity for FY2005. After FY2005, assume landfills accept 1.6% more waste per year.

(7) C&D Capacity Shortfall = C&D/Oversized MSW disposed minus C&D/Oversized MSW In-State Disposal Capacity

(8) Assumes Hartford Landfill which is currently receiving 27 (000) tons in FY2005 closes in 2006

(9) Assumes Windsor-Bloomfield Landfill receiving 39 (000) tons in FY2005 closes December 2008, resulting in a reduction of 20 (000) tons of disposal capacity in FY2009 and an additional reduction of 20 (000) tons of disposal capacity in FY2010.

(10) Assumes the Manchester Landfill extends its permit and continues to operate, closing in 2022

Table J-6
CT Construction and Demolition (C&D) Waste/Oversized MSW (1) (2) Projections and In-State Disposal Capacity Projections, 2005-2024
(Assumes C&D Diversion Rate of 40% by 2014 and remaining at that level through 2024)

FY = July previous year through June of years listed	Fiscal Year	C&D/Oversized MSW Processed or Disposed by CT Solid Waste Facilities (000 TPY) (3)	Percent C&D/Oversized MSW Diverted from Disposal (4)	C&D/Oversized MSW Disposed (000 TPY) (5)	Estimated In-State Disposal Capacity (000 TPY) (6)	C&D/Oversized MSW In-State Disposal Capacity Shortfall (000 TPY) (7)
July '04 - June '05	2005	1,145	7%	1,066	126	940
July '05 - June '06	2006	1,163	10%	1,047	128	919
July '06 - June '07	2007 (8)	1,182	15%	1,005	103	902
July '07 - June '08	2008	1,201	20%	961	104	856
July '08 - June '09	2009 (9)	1,220	25%	915	86	829
July '09 - June '10	2010	1,240	35%	806	67	738
July '10 - June '11	2011	1,259	36%	806	68	738
July '11 - June '12	2012	1,280	37%	806	69	737
July '12 - June '13	2013	1,300	38%	806	71	735
July '13 - June '14	2014	1,321	39%	806	72	734
July '14 - June '15	2015	1,342	40%	805	73	732
July '15 - June '16	2016	1,363	40%	818	74	744
July '16 - June '17	2017	1,385	40%	831	75	756
July '17 - June '18	2018	1,407	40%	844	76	768
July '18 - June '19	2019	1,430	40%	858	78	780
July '19 - June '20	2020	1,453	40%	872	79	793
July '20 - June '21	2021	1,476	40%	886	80	806
July '21 - June '22	2022	1,500	40%	900	81	818
July '22 - June '23	2023 (10)	1,524	40%	914	4	910
July '23 - June '24	2024	1,548	40%	929	4	925

(1) "Oversized MSW" is not consistently reported; sometimes it is reported as "bulky" or C&D waste (included in this table); sometimes it is reported as MSW (included in tables presenting CT MSW figures); CT definition for bulky waste and MSW contribute to this confusion.

(2) The figures presented in this table are based on C&D and "bulky waste" data reported by CT C&D volume reduction facilities (VRFs), CT transfer stations (TSs), CT Dept. of Transportation and CT landfills (LFs). This table does not include figures regarding clean wood reported recycled by CT recycling facilities or by CT municipalities. Figures reported for FY2004 have been escalated 1.6% to arrive at FY2005 estimates.

(3) C&D projections based on FY2004 C&D and "bulky waste" data reported to DEP (see footnote #1) and assumes a 1.6% annual increase in the amount of such waste generated.

(4) The 7% diversion (recycling) rate is the CT current C&D diversion rate as calculated from data submitted to the CT DEP as described in footnote #2.

(5) Disposed both in-state and out-of-state

(6) In-State disposal includes current landfill capacity for FY2005. After FY2005, assume landfills accept 1.6% more waste per year.

(7) C&D Capacity Shortfall = C&D/Oversized MSW disposed minus C&D/Oversized MSW In-State Disposal Capacity

(8) Assumes Hartford Landfill which is currently receiving 27 (000) tons in FY2005 closes in 2006

(9) Assumes Windsor-Bloomfield Landfill receiving 39 (000) tons in FY2005 closes December 2008, resulting in a reduction of 20 (000) tons of disposal capacity in FY2009 and an additional reduction of 20 (000) tons of disposal capacity in FY2010.

(10) Assumes the Manchester Landfill extends its permit and continues to operate, closing in 2022

Table J-7
CT Construction and Demolition (C&D) Waste/Oversized MSW [1] [2] Projections and In-State Disposal Capacity Projections, 2005-2024
(Assumes C&D Diversion Rate remains at 7% Through 2024)

FY = July previous year through June of years listed	Fiscal Year	C&D/Oversized MSW Processed or Disposed by CT Solid Waste Facilities (000 TPY) [3]	Percent C&D/Oversized MSW Diverted from Disposal[4]	C&D/Oversized MSW Disposed (000 TPY) [5]	Estimated In-State Disposal Capacity (000 TPY) [6]	C&D/Oversized MSW In-State Disposal Capacity Shortfall (000 TPY) [7]
July '04 - June '05	2005	1,145	7%	1,066	126	940
July '05 - June '06	2006	1,163	7%	1,082	128	954
July '06 - June '07	2007 [8]	1,182	7%	1,099	103	997
July '07 - June '08	2008	1,201	7%	1,117	104	1,013
July '08 - June '09	2009 [9]	1,220	7%	1,135	86	1,049
July '09 - June '10	2010	1,240	7%	1,153	67	1,086
July '10 - June '11	2011	1,259	7%	1,171	68	1,103
July '11 - June '12	2012	1,280	7%	1,190	69	1,121
July '12 - June '13	2013	1,300	7%	1,209	71	1,138
July '13 - June '14	2014	1,321	7%	1,228	72	1,157
July '14 - June '15	2015	1,342	7%	1,248	73	1,175
July '15 - June '16	2016	1,363	7%	1,268	74	1,194
July '16 - June '17	2017	1,385	7%	1,288	75	1,213
July '17 - June '18	2018	1,407	7%	1,309	76	1,233
July '18 - June '19	2019	1,430	7%	1,330	78	1,252
July '19 - June '20	2020	1,453	7%	1,351	79	1,272
July '20 - June '21	2021	1,476	7%	1,373	80	1,293
July '21 - June '22	2022	1,500	7%	1,395	81	1,313
July '22 - June '23	2023[10]	1,524	7%	1,417	4	1,413
July '23 - June '24	2024	1,548	7%	1,440	4	1,436

(1) "Oversized MSW" is not consistently reported; sometimes it is reported as "bulky" or C&D waste (included in this table); sometimes it is reported as MSW (included in tables presenting CT MSW figures); CT definition for bulky waste and MSW contribute to this confusion.

(2) The figures presented in this table are based on C&D and "bulky waste" data reported by CT C&D volume reduction facilities (VRFs), CT transfer stations (TSs), CT Dept. of Transportation and CT landfills (LFs). This table does not include figures regarding clean wood reported recycled by CT recycling facilities or by CT municipalities. Figures reported for FY2004 have been escalated 1.6% to arrive at FY2005 estimates.

(3) C&D projections based on FY2004 C&D and "bulky waste" data reported to DEP (see footnote #1) and assumes a 1.6% annual increase in the amount of such waste generated.

(4) The 7% diversion (recycling) rate is the CT current C&D diversion rate as calculated from data submitted to the CT DEP as described in footnote #2.

(5) Disposed both in-state and out-of-state

(6) In-State disposal includes current landfill capacity for FY2005. After FY2005, assume landfills accept 1.6% more waste per year.

(7) C&D Capacity Shortfall = C&D/Oversized MSW disposed minus C&D/Oversized MSW In-State Disposal Capacity

(8) Assumes Hartford Landfill which is currently receiving 27 (000) tons in FY2005 closes in 2006

(9) Assumes Windsor-Bloomfield Landfill receiving 39 (000) tons in FY2005 closes December 2008, resulting in a reduction of 20 (000) tons of disposal capacity in FY2009 and an additional reduction of 20 (000) tons of disposal capacity in FY2010.

(10) Assumes the Manchester Landfill extends its permit and continues to operate, closing in 2022

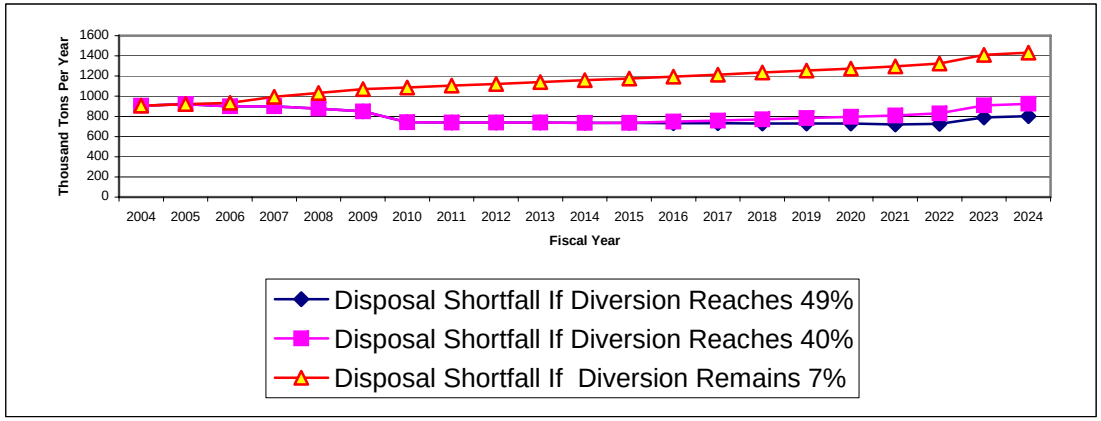


Figure J-3
Projections of In-State C&D Waste/Oversized MSW Disposal Capacity Shortfall Under Various Waste Diversion Assumptions for the Period FY2005 through FY2024

Appendix K
MSW RRF STATUS OF OWNERSHIP

At the writing of the Amendment to this Plan (July 2006) there are six MSW resources recovery facilities (RRFs) in Connecticut that process MSW with a combined maximum permitted design capacity of 2.6 million tons per year; all but the Lisbon and Bristol facilities are part of the CRRA system. Over the next ten to fifteen years the following will occur: (1) expiration of the RRF contracts with municipalities and/or with CRRA or other regional resource recovery authorities or operating committees; (2) retirement of the bonds that financed the RRFs; and (3) potential transfer of control of the processing capacity from the public to the private sector at four of the Connecticut RRFs. In order to fully explain these issues and their ramifications for Connecticut, the following information was provided at the request of the CT DEP: (1) a brief description of ownership issues regarding the Lisbon Resource Recovery Facility provided by the Plant Manager of the Lisbon RRF; (2) a description of the Bristol Resource Recovery Facility contractual scenarios provided by the Bristol Resource Recovery Facility Operating Committee (BRRFOC); and (3) a letter and Exhibit provided by the CRRA regarding the solid waste facilities currently owned and operated by CRRA on behalf of municipalities.

Lisbon RRF (information provided by John O'Rourke, Lisbon's Plant Manager)

The Lisbon RRF is owned by the Eastern CT Resource Recovery Authority with the lone member being the City of Middletown, CT. The facility will be owned by ECRRA when the municipal bonds are paid in 2020. Wheelabrator has an operating agreement with the Authority with no ownership interest. HRRA (Housatonic Resources Recovery Authority) member towns have a disposal agreement with Wheelabrator CT and their waste is disposed at Wheelabrator facilities in Connecticut and out-of-state, including the Lisbon RRF.

Bristol Resource Recovery Facility Contractual Scenarios – Provided by Jonathan Bilmes, Executive Director – Bristol Resource Recovery Facility Operating Committee/Tunxis Recycling Operating Committee (BRRFOC/TROC) - July 7, 2006

As of August 1, 1985, the original Contracting Communities, now 14 of them, entered into an Amended and Restated Service Agreement (the "Agreement") with Ogden Martin Systems of Bristol, Inc., now Covanta of Bristol, Inc. (the "Company") whereby the Company would own, operate and maintain a waste to energy facility in Bristol (the "Facility"), and the Contracting Communities committed to deliver Acceptable Waste to the Facility. The Agreement continues in effect to July 1, 2014 when the respective obligations of the Company and Contracting Communities terminate. Pursuant to the Agreement, the following options or avenues are availability to the Company and the Contracting Communities:

Unless one of the options described below are exercised, in 2014 the Company can contract with anyone to deliver Municipal Solid Waste ("MSW") to the Facility since it will own the Facility free and clear, and its obligations to the Contracting Communities are terminated. Under this scenario, the Company could cease or reduce operations, sell the Facility or fill the capacity of the Facility with Contracting Community MSW, merchant MSW and/or out of state waste MSW.

Existing Options in the Agreement for Contracting Communities:

1. Agreement Section 8.01(b) Term. One or more Contracting Communities have the option to extend the Agreement for a period of 5 years, provided that the Electricity Agreement with CL&P will not expire or be terminated prior to the end of the five year period[1]. There is a one year notice requirement for the Contracting Communities to notify the Company of the option.
2. Agreement Section 8.20 Option to Contract. One or more Contracting Communities can contract with the Company for the entire disposal capacity[2] of the Facility on the basis of a negotiated Agreement. At least one year notice of intent is required from the Contracting Communities at which time the parties are to promptly commence negotiations in a good faith effort upon the terms of, and execute such an Agreement.
3. Agreement Sections 8.21 and 8.22 Fair Market Value Option and Determination of Fair Market Value. Prior to termination, the Contracting Communities may purchase the Facility from the Company at Fair Market Value[3]. The Agreement sets forth a process to arrive at the Fair Market Value of the Facility. The Agreement requires that the Company be released from all liability under the Electricity Agreement for the purchase to be accomplished.

[1]In today's electric marketplace, the ability to extend the existing Electricity Agreement and/or secure a commercially reasonable new five year Electricity Agreement is uncertain.
[2]None of the existing Contracting Communities individually have enough MSW for the entire disposal capacity of the Facility. The Agreement does not define "good faith effort."
[3]The Contracting Communities have to defease any outstanding Bonds in addition to paying the Company the Fair Market Value.

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June 14, 2006

Mr. Robert Kaliszewski
Director of Planning & Program Development Connecticut Department of Environmental Protection 79 Elm Street
Hartford, Connecticut 06106-5127

RE: CRRA Waste Disposal Facility Ownership and Contract Structure

Dear Mr. Kaliszewski

CRRA is writing in response to a request from the CTDEP to provide a summary overview of the structure and ownership of the comprehensive solid waste disposal and recycling facilities currently owned and operated by CRRA on behalf of Connecticut's municipalities. This summary is presented as Exhibit I to this letter.

As stated in the attached summary, CRRA owns, among other facilities, four waste-to-energy plants for the disposal of municipal solid waste ("MSW"). The plants are located in Bridgeport, Wallingford, Hartford (Mid-Connecticut Project), and Preston (Southeast Project). The resource recovery revenue bonds ("Bonds") issued by CRRA to finance the acquisition and construction of each facility will be retired in 2008,2010,2012 and 2015 respectively. Upon the payment of the Bonds and expiration of relevant project agreements, three of the four waste-to-energy plants may convert from public ownership to private ownership. Only the Mid-Connecticut waste-to-energy plant will remain publicly held.

This transition of ownership has potential adverse impacts to waste management and recycling in the State:

- Over 1,000,000 tons of MSW disposal capacity currently dedicated to the waste disposal needs of over 40 Connecticut municipalities will become merchant capacity with no guarantee that the capacity will be used for the disposal of Connecticut generated waste. In other words, operators of these plants could simply accept waste from whoever is willing to pay top dollar regardless of whether that waste comes from Connecticut or a neighboring state. The Preston plant is less than 15 miles from the Rhode Island border, while the Bridgeport plant is less than 60 miles from midtown Manhattan.

- Private ownership of the waste-to-energy plants could result in a reduction in the amount of material recycled by the communities presently served by such facilities. Varying somewhat by project, CRRA' s current tip fee structure includes not only the cost of providing MSW disposal services but also the bundling of services and associated costs for recycling of commingled containers, fiber, and electronics, recycling educational programs and other services provided by CRRA. Each year all these costs are "bundled" into a uniform MSW tip fee as part of the annual budgetary process. CRRA has never charged a separate tip fee for recycling or an additional fee for any of these other services. Private-sector operators cannot be expected to follow suit, and, absent the current project structure, these services will likely be unbundled, with the imposition of additional fees adversely impacting recycling rates.

If not properly addressed, the transition from public to private ownership may adversely impact future progress toward achieving the diversion/recycling goals proposed in DEP's draft Solid Waste Management Plan.

Sincerely

Floyd M. Gent
Director of Operations

Cc: Tom Kirk
Peter Egan

EXHIBIT 1

Connecticut Resources Recovery Authority

Project Ownership and Contract Structure[4]

The Connecticut Resources Recovery Authority ("CRRA ") in meeting its obligations under state statute has planned, designed, financed, built, manages and owns four waste- to-energy projects: Bridgeport, Mid-Connecticut, Southeast and Wallingford Projects. Through municipal service agreements with Connecticut municipalities and the Southeastern Connecticut Regional Resources Recovery Authority ("SCRRRA "), and solid waste delivery agreements with over 60 private haulers, CRRA serves the municipal solid waste needs of 118 Connecticut municipalities and its citizens.

In conformance with Connecticut General Statute Sec. 22a-259 and 262, CRRA has entered into various service agreements with private sector contractors for the operation and maintenance of each facility as further described hereafter. As part of the original project financing for the Bridgeport, Southeast and Wallingford Projects, CRRA entered into lease agreements with the operator or a financial institution as the lessee, whereby the lessee has the right to purchase the waste-to-energy facility upon expiration of the project lease. The Mid-Connecticut Project will remain a publicly owned facility with CRRA.

Bridgeport Project

The Bridgeport Project, consisting of a mass burn resource recovery facility located in Bridgeport, a regional recycling center in Stratford, the Shelton landfill, the Waterbury landfill, and eight transfer stations, is currently owned by CRRA. The Bridgeport Project provides solid waste disposal services to nineteen Connecticut municipalities in Fairfield and New Haven counties through municipal service agreements with CRRA. Pursuant to a Solid Waste Disposal Agreement ("SWDA") with CRRA, Wheelabrator Bridgeport, LP, is responsible for operating the facility and transfer stations for a term ending on December 31, 2008. As part of the original sale and leaseback financing transaction in 1988, CRRA leased the facility to Ford Motor Credit Company as an owner trustee. Upon the repayment of the project bonds or at the end of the lease, the current owner trustee, which is a limited liability company principally owned by John Hancock Life Insurance Company, has the right to purchase the waste-to energy facility for $1.00. It is expected that the owner trustee will exercise its purchase option and therefore will own the facility post 2008. Currently, CRRA, with the support of the Bridgeport Project towns, and Wheelabrator

[4] The financing, structuring and ownership for each project are complex and involve a number of interrelated agreements including but not limited to bond indentures, facility and site leases, operating agreements and municipal service agreements. The description of the project ownership and contract structure herein is provided as an overview for informational purposes only, and is not intended to be a comprehensive legal review thereof.

are pursuing good faith negotiations for a long term extension of the SWDA for the period after December 31, 2008. Depending on the outcome of the negotiations, part or all of the facility capacity may be privately controlled by Wheelabrator.

Mid-Connecticut Project

The Mid-Connecticut Project consists of a refuse derived fuel resource recovery facility located in Hartford, four transfer stations, the Hartford landfill, the Ellington landfill and a regional recycling center located in Hartford. This system of facilities provides solid waste disposal services to 70 Connecticut municipalities through municipal service agreements. The resource recovery facility includes the power block and electric generating facilities which are operated by Covanta Energy and the waste processing facility which is operated by the Metropolitan District Commission ("MDC"). The operating agreements with Covanta and the MDC will expire in 2012. CRRA currently owns the resource recovery facility, the transfer stations, the Ellington landfill and the container-processing portion of the regional recycling center (211 Murphy Road) in Hartford. CRRA controls the Hartford landfill under a long-term lease with the City of Hartford. CRRA leases the land for the Essex transfer station. CRRA controls the solid waste operating permit for the paper processing portion of the regional recycling center, (123 Murphy Road) while the property, building, and processing equipment is owned by a private company. CRRA is currently in the process of combining the commingled container and paper processing into a single operation under one roof at 211 Murphy Road. FCR, Inc., the current operator for processing commingled container recyclables, will build, own, and operate the processing equipment at the new regional recycling center at 211 Murphy Road for a term of 10 years. At the expiration of the 10-year term, CRRA has the right to purchase the equipment for one dollar or extend the agreement for five years. On or before November 2012, CRRA will have paid off the outstanding project bonds and will retain ownership of a debt free facility to continue to serve the disposal needs of Connecticut municipalities.

Southeast Project

The Southeastern Project consists of a mass burn resource recovery facility located on an approximately l2-acre site in Preston and the Montville landfill. The system provides solid waste disposal services to 22 municipalities in the eastern portion of Connecticut through municipal service agreements. The municipal service agreements and operating agreements will expire November 2015. The Facility was designed and constructed by American Ref-Fuel. The Facility is owned by CRRA and the Facility site is owned by SCRRRA. CRRA and SCRRRA are parties to a Bridge and Management Agreement under which SCRRRA is obligated to deliver to the Facility all Acceptable Waste generated within the boundaries of the Participating Municipalities. As part of the Facility's financing transaction, SCRRRA leased the Facility site to American Ref-Fuel. Covanta Energy, Inc., as the successor to American Ref-Fuel, has beneficial ownership of the Facility through this arrangement. When the bonds are fully paid off in November 2015 (or earlier), Covanta has the

option to purchase the facility for $1.00. The current service agreement provides for a five-year extension at substantially the same terms. At the end of the first renewal term, if Covanta elects to continue operating the facility, CRRA has the option to extend the term for an additional five years at the then fair market value. At the end of the second extension term (or at the end of the initial term or the first extension term if Covanta does not elect to continue operation) CRRA has the option to purchase the facility at fair market value. If CRRA does not purchase the facility, then Covanta retains ownership of the facility and continues to lease the land from SCRRRA.

Wallingford Project

The Wallingford Project consists of a mass bum resource recovery facility, the Wallingford landfill and a 45 acre parcel of land adjacent to the landfill all owned by CRRA and located in Wallingford. Five municipalities in New Haven County are provided solid waste disposal services by the Project through municipal service agreements with CRRA. The resource recovery facility is operated by Covanta Energy, Inc. pursuant to an Operator Agreement. All the Project agreements expire June 30, 2010. Subject to certain conditions, the Operator Agreement provides for one five-year renewal term post June 30, 2010. Both Covanta Energy, Inc. and CRRA have the right to exercise options to extend. Either party must exercise its option to extend (declare its intent to extend) in 2007. In addition to the extension options, any time prior to January 31,2010, Covanta has the right to purchase the facility for $1.00 and operate the facility as a privately owned waste-to-energy facility or CRRA can purchase the facility from Covanta at fair market value. Covanta' s contractual right to purchase the facility supersedes all other extension options contained in the Operator Agreement. If neither Covanta nor CRRA exercise its respective options to extend or purchase the Facility, the Facility ceases operation and the land reverts to American Cyanamid. American Cyanamid could then direct CRRA to restore the property "cleared to grade".

CRRA Value Added Services

Through the ownership and contract structure of the four resource recovery projects, CRRA has been able to offer the following benefits and value added services to the majority of the 169 municipalities and its citizens in the State of Connecticut:

- Economies of scale, standardization, risk reduction and capital avoidance through the aggregation of waste on a project basis to maximize resources recovery and recycling in order to protect and preserve the environment.
- Uniform disposal fees to private haulers on a project by project basis to encourage a competitive market for waste collection and transportation services to residential and commercial customers.
- Bundling of recycling and waste disposal services including billing, waste delivery inspection, enforcement, environmental regulation compliance, and recycling education programs.

- Operation of two regional recycling centers (the largest in Connecticut) serving approximately 90 Connecticut municipalities.
- Operation of the CRRA Trash Museum in Hartford and the CRRA Children's Garbage Museum in Stratford serving all of Connecticut and educating more than 20,000 children and adults annually.
- Electronics recycling programs for over 90 Connecticut municipalities.