Construction & Demolition Waste Management in the Northeast in 2006

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About NEWMOA

The Northeast Waste Management Officials' Association (NEWMOA) is a nonprofit, nonpartisan interstate association that has a membership composed of the hazardous waste, solid waste, waste site cleanup and pollution prevention program directors for the environmental agencies in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. NEWMOA was established by the Governors of the New England states as an official regional organization to coordinate interstate hazardous and solid waste, waste site cleanup, and pollution prevention activities and support state waste programs, and was formally recognized by the U.S. Environmental Protection Agency (EPA) in 1986.
NEWMOA's mission is to develop and sustain an effective partnership of states that helps achieve a clean, healthy, and sustainable environment by exploring, developing, promoting, and implementing environmentally sound solutions for:

- Reducing materials use and preventing pollution and waste,
- Properly reusing and recycling discarded materials that have value,
- Safely managing solid and hazardous wastes, and
- Remediating contaminated sites.

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Executive Summary

Construction and Demolition Waste Management in the Northeast in 2006 describes the quantity of construction and demolition (C&D) waste that is generated, processed, recovered, and disposed in the Northeast Waste Management Officials' Association (NEWMOA)-member states. The purpose of this Report is to help the member states and EPA understand how C&D waste is managed in the Northeast. In addition, states and EPA can use the Report to assess baseline data from which to measure progress, identify possible regulatory or reporting changes, and inform their policy-making process.

The Report discusses the definition of C&D waste by the state environmental agencies in the Northeast in 2006 and NEWMOA's data gathering and analysis methodology. The Report provides an overview of 2006 regional C&D waste data, including discussions of waste generation, disposal, processing, and markets for recycled materials. The Appendices include state-specific Sections that analyze generation, disposal, processing, and markets for the C&D waste generated and/or handled by facilities. This study analyzes the data reported by C&D waste management facilities that are regulated by each of the eight Northeast state environmental authorities, and therefore is limited to the C&D waste quantities that pass through a regulated waste facility.

The Report has four primary findings:

- The availability and quality of data regarding C&D waste management is not consistent among the Northeast states making aggregation and comparisons challenging.
- Most C&D waste ends up in a landfill – in 2006, approximately 10 percent of estimated generation was recovered for an end use outside a landfill.
- There is significant potential to increase recovery of C&D wastes - metal was the only C&D material recovered at a significant percentage of estimated generation in 2006.
- Some changes have occurred in C&D waste management since 2006, although their effects on C&D waste disposal, processing, and materials recovery have not been analyzed.

In 2006, there was variability in both the definition of C&D waste and the types and quality of the information obtained from C&D management facilities among the NEWMOA-member states. Generally, the definition of C&D waste includes such materials as wood, brick, concrete, asphalt pavement, glass, metal, drywall, and asphalt shingles generated during the construction, remodeling, or demolition of structures. Construction projects, particularly those involving demolition, can generate other wastes, such as plastic buckets, pipe and wrap, cardboard boxes, plumbing, electrical and other fixtures, and wire that are also sent for disposal or processing. Generally, interior finishing items, such as carpets and furniture are not considered C&D waste, but in practice could be included in demolition waste. To the extent feasible, NEWMOA did not include asphalt, brick, and concrete (ABC) wastes generated from road and bridge projects

and/or wood from landclearing projects in the data presented in this Report. The quantity of ABC material generated by road and bridge projects often dwarfs the quantity generated from other sources and can significantly bias the data on the overall management of C&D wastes.

NEWMOA found that the total C&D waste generation in the Northeast in 2006 was approximately 12,065,582 tons. The per-capita generation of C&D waste varies widely among states for various reasons, including limitations on data availability, from roughly 0.19 to 0.42 tons per person per year.

C&D waste is mainly disposed in landfills – either landfills permitted to accept only C&D waste, or landfills that receive primarily municipal solid waste (MSW). An estimated 10,025,267 tons of C&D waste generated in the Northeast went to a landfill in 2006, with 8,465,691 tons, or 70 percent of the total estimated C&D waste generation, disposed as C&D waste and 1,559,576 tons used as alternative daily cover (ADC) in landfills.

Management of construction and demolition waste is regional in the Northeast. Facilities in all NEWMOA-member states import and/or export C&D wastes, and depend on each other for waste management services. Maine and New Hampshire are net importers of C&D wastes for disposal. Connecticut, Massachusetts, New Jersey, and New York are net exporters of C&D wastes for disposal and are reliant on export for disposal at facilities in non-NEWMOA states. Rhode Island and Vermont import or export only small quantities of C&D waste for disposal.

Facilities in NEWMOA-member states differ in how C&D waste is managed – in some states most of the waste is sent to a processing facility, and in others a significant quantity is disposed directly in a landfill without prior processing. However, the overall effect on the quantity recovered when compared to the quantity generated is similar across the Northeast states. In 2006, no Northeast state recovered C&D wastes, as a percentage of generation, at a rate notably higher than the others.

Commercial C&D waste processing facilities are located in every NEWMOA-member state except Vermont. C&D waste processing facilities take in mixed C&D wastes and recover at least a portion of the material. However, there is wide variability in how wastes are handled at these facilities and the quantity and types of materials that they recover. At the low end of the processing spectrum, there are some facilities where mixed C&D wastes are tipped onto the ground outdoors, the metals are removed, and the remaining material is run-over and pushed around by a bulldozer to reduce its volume. This size-reduced material is then loaded into a truck or railcar for transport for disposal or use as ADC at a landfill. At other facilities, the tipping and processing areas are entirely enclosed and an automated system, supplemented by manual picking, is used to recover significant quantities of several different materials. There is no common standard as to how C&D wastes are processed at facilities in different states or even within a single state.

C&D waste processing facilities in each of the NEWMOA-member states receive some out-of-state material. Once material enters a C&D waste processing facility, the data is not available to correlate output quantities to a state of origin. Therefore, from the available data the percentage of C&D waste generated by a single state that is recovered for reuse or recycling cannot be determined. For the New England states only, 484,698 tons of material was recovered, or 10

percent of the estimated total C&D waste generation (4,657,670 tons) in 2006. C&D waste processing data from New Jersey and New York includes ABC from road and bridge projects and therefore, could not be aggregated. In 2006, the majority of C&D waste processed was ultimately landfill disposed or used in the landfill environment as ADC.

Overall, in 2006, there was a significant difference between the quantity of C&D materials generated and the quantity recovered, indicating potential opportunities to significantly increase recovery of C&D wastes. The materials recovered from C&D wastes in 2006 were primarily metal, clean wood, wood fuel chip, and ABC aggregates. The only material recovered in significant quantities in 2006 was metal, with approximately 53 percent of the estimated generation recovered. The actual recovery rate may have been even higher as metals could have been recovered from job sites before they reached a regulated facility – and due to data limitations, the reported figures do not include metal recovery in New Jersey. In 2006, C&D wood processed into wood fuel chip was the main material recovered by facilities in Maine and New Hampshire, and was a significant output from facilities in Massachusetts, New York, and Rhode Island. Clean wood was the primary material recovered by C&D processing facilities in Connecticut.

Some changes have occurred in C&D waste management since 2006, although data to analyze their effects on disposal, processing, and materials recovery are not yet available. In 2007 and early 2008, the economy was robust creating a large supply of C&D waste from building construction, demolition, and renovation projects, and the world economy provided strong markets for many recovered materials, particularly metals and wood. Several new businesses opened during this time in the Northeast to process mixed C&D materials, as well as segregated materials, such as post-consumer asphalt shingles and new construction gypsum wallboard scraps. However, late in 2008, the economy changed dramatically, reducing construction activity as well as markets for recovered materials. The combined effect of these changes on the financial viability of some C&D waste processing facilities is uncertain.

Construction & Demolition Waste Management in the Northeast in 2006

Introduction

Construction and Demolition Waste Management in the Northeast in 2006 focuses on the quantity of construction and demolition (C&D) waste that is generated, processed, and disposed in the Northeast Waste Management Officials' Association (NEWMOA)-member states[1]. This Report characterizes the origin of the material and identifies the disposition of the processed material. The purpose of this Report is to help the member states and EPA assess baseline data from which to measure progress, identify possible regulatory or reporting changes, and inform their policy-making process.

Historically, much of the C&D waste generated in the Northeast was deposited directly in landfills, either one handling municipal solid waste or one specially designated for C&D material. However, available landfill space is becoming increasingly limited in most of the NEWMOA-member states, and public opposition has severely limited the siting of new landfills. This diminishing landfill capacity and the increasing cost of landfill disposal have lead to greater emphasis on the processing of C&D material to reduce its volume and to prepare it for use in new applications.

Overview of the Report

The first Section of this Report provides a discussion of the definition of C&D waste for this Report - what it includes and does not include – and a description of how NEWMOA obtained the C &D waste data. Following this Introduction, the Regional Summary Section presents an overview of 2006 regional C & D waste data, including discussions of waste generation, disposal, processing, and markets. The Report's appendices include eight state-specific Sections each covering analysis of generation, disposal, processing, markets, and data collection for the C&D waste generated and/or handled by facilities in that state. Throughout this Report, bar graphs and tables illustrate the data.

Definition of Construction & Demolition Waste

C&D waste consists of such materials as wood, brick, concrete, asphalt pavement, glass, metal, drywall, and asphalt shingles generated during the construction, remodeling, or demolition of structures. Construction projects, particularly those involving demolition, can generate other wastes, such as plastic buckets, pipe and wrap, cardboard boxes, plumbing, electrical and other fixtures, and wire that are also sent for disposal or processing. Generally, interior finishing items, such as carpets and furniture are not considered C&D waste, but in practice could be included in demolition waste.

[1] The Northeast Waste Management Officials' Association (NEWMOA) is a nonprofit, nonpartisan interstate association that has a membership composed of the hazardous waste, solid waste, waste site cleanup, and pollution prevention program directors for the environmental agencies in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

In 2006, there was some variability among the NEWMOA-member states in their definitions of C&D waste for reporting purposes. The definition of C&D material for each of the NEWMOA-member states is presented in Table 1.

Table 1 shows that land-clearing debris, such as tree limbs, brush, and stumps are considered C&D debris in some states and not in others.[2] For the most part, land-clearing debris is free of chemical contamination and can be chipped for landscaping mulch or compost. For this reason, separate facilities typically handle C&D and land-clearing material (even in states that do include it in their definition of C&D waste). Facilities that accept land-clearing debris generally do not accept other C&D materials. The data collected for this Report did not include reports from facilities that only process land-clearing debris. However, if a facility that handles other C&D material also processes some land-clearing debris, their clean wood output is included in the presentation.

"Inert" material, such as asphalt, brick, and concrete (ABC) generated from road and bridge projects is another category of materials that only some of the NEWMOA-member states include in their definition of C&D waste.[3] The quantity of ABC material generated by road and bridge projects often dwarfs the quantity generated from other sources. In addition, material from road projects is generally effectively recycled into aggregate for road base or new asphalt or concrete. Processing of ABC from road and bridge projects often occurs at the job site or at facilities that specialize in that activity. To the extent possible, the information presented in this Report does not include ABC debris, unless it is handled at a facility that processes other C&D materials, in which case the data on ABC from road projects cannot be separated. In the New England states, facilities that process ABC from road and bridge projects typically do not accept other C&D materials or ABC generated from other sources. In New Jersey and New York, some facilities handle ABC produced from both structures and roadways. The data presentations throughout the Report highlight these circumstances.

[2] Land-clearing debris is included in the definition of C&D waste in NJ, NY, and RI.
[3] Debris from road and bridge work is included in the definition of C&D waste in MA, NH, NY, and VT.

Table 1: State Definitions of Construction & Demolition Waste – 2006

	Connecticut	Maine	Massachusetts	New Hampshire	New Jersey	New York	Rhode Island	Vermont
Definitions of Bulky Waste and/or C&D Waste	**C&D waste:** waste building materials and packaging resulting from construction, remodeling, repair and demolition operation on houses, commercial buildings and other structures, excluding asbestos. CT regulations define C&D waste as part of MSW, but it is often categorized as bulky waste when disposed. **Bulky waste**: land-clearing debris and waste resulting directly from demolition activities other than clean fill. Clean fill means natural soil, or rock, brick, ceramics, concrete, and asphalt paving fragments that are virtually inert.	**C&D waste**: solid waste from construction, remodeling, repair, or demolition of structures (includes furniture). Excludes: glues, tars, solvents, resins, paints, caulking compounds, friable asbestos and other special wastes.	**C&D waste:** resulting from construction, remodeling, repair, or demolition of buildings, pavements, roads, or other structures. Does not include land-clearing debris. **Bulky waste**: items of unusually large size, including furniture, rolls of fencing, carpets, mattresses.	**C&D waste**: non-putrescible waste building materials and rubble resulting from construction, remodeling, repair, or demolition of structures or roads. Excludes: asbestos waste, garbage, corrugated container board, electrical fixtures containing hazardous materials, furniture, appliances, tires, drums, containers and fuel tanks. **Bulky waste**: large items that cannot be handled by traditional solid waste methods such as: appliances, furniture, large auto parts, tires, tree stumps.	**C&D waste**: building material and rubble resulting from construction, remodeling, repair, and demolition operations. Includes land-clearing debris, treated and untreated wood scrap, concrete, asphalt, brick and block, plaster wallboard and roofing material, and such items as dirt, corrugated cardboard, plastic scrap, non-asbestos insulation, carpets, and padding. **Bulky waste**: Large items of waste material, including discarded vehicles/parts and tires.	**C&D debris**: uncontaminated solid waste resulting from construction, remodeling, repair, and demolition of utilities, structures and roads, and from land-clearing. Does not include: asbestos waste, garbage, corr-ugated container board, electrical fixtures con-taining hazardous liquids, fluore-scent lights, carpeting, furn-iture, appliances, tire, drums, containers greater than 10 gallons, containers with more than 1 inch residue, and fuel tanks. Excludes: waste that has been processed so the individual components are unrecognizable, unless generated at a department-approved facility.	**C&D waste**: non-hazardous waste resulting from construction, remodeling, repair, and demolition of utilities and structures, and from land-clearing. Does not include: asbestos waste, garbage, corrugated container board, electrical fixtures containing hazardous liquids, fluorescent lights, carpeting, furniture, appliances, tire, drums, containers greater than 10 gallons, containers with more than 1 inch residue, and fuel tanks. Excludes: waste that has been processed so the individual components are unrecognizable.	**C&D waste**: waste derived from construction or demolition of buildings, roadways or structures. Includes furniture and mattresses. Excludes: asbestos waste, regulated hazardous waste, household hazardous waste, hazardous waste from Conditionally Exempt Generators, or any material banned from landfill disposal. **Bulky waste**: included in "other" category.

Methodology

C&D waste management facilities in each of the NEWMOA-member states are required to annually submit information on their activities to the environmental agencies. The state agencies review the information submitted. For this Report, the NEWMOA member solid waste programs shared the following aggregated data on C&D waste management for calendar year 2006, to the extent each state collects it, with NEWMOA staff for analysis and presentation:

- generated in-state and disposed in-state
- generated out-of-state and disposed in-state (broken down by origin state(s))
- generated in-state and processed at an in-state processor
- generated out-of-state and processed at an in-state processor (broken down by origin state(s))
- generated in-state and sent out-of-state for disposal without processing
- generated in-state and sent out-of-state for processing
- leaving in-state C&D processors broken down by type of product and destination, including waste for disposal

All NEWMOA-member states collect data from facilities in their state that dispose of C&D wastes. For most of these states, this data includes information on the state of origin, except for Rhode Island, whose information states that the waste source is "out-of-state".

The data submitted by processing facilities varies among the NEWMOA-member states, as follows:

- Connecticut, Maine, and Massachusetts collect information on incoming waste sources and the disposition of the outgoing products and wastes.
- New York collects information on incoming material sources and outgoing material types and quantities, but their data on the destination is not as precise as other states.
- New Hampshire collects information on overall quantities of incoming C&D materials processed, but does not require reporting on the outgoing materials or destinations.
- New Jersey collects extensive data on outputs from facilities that manage C&D wastes, but does not distinguish the sources of the incoming material, which could be municipal solid waste, road projects, or C&D wastes.
- Rhode Island collects data on outputs from processors, and has details for some processors and less for others.
- Vermont does not currently have any processing facilities, and therefore no data on processing C&D waste is available.

Further discussion of individual state data quality is provided in each of the state-specific appendices.

NEWMOA staff reviewed the data supplied by the member states to determine how comparable the data is and to identify data gaps and inconsistencies. NEWMOA staff contacted state agency staff to resolve inconsistencies and collected facility-specific data, if available. Where feasible and appropriate, NEWMOA staff contacted C&D waste processors to further characterize the origin and disposition of materials. As discussed above, for states that includes C&D waste from road projects and land-clearing in their data submissions, where possible NEWMOA staff identified and removed this information for the presentations in this Report.

An important source of C&D waste data cited in this Report is the NEWMOA Report, *Interstate Flow of Construction & Demolition Waste Among the NEWMOA States in 2002*.[4] Where possible, 2002 data from this Report and 2006 C&D waste data are compared in the state-specific appendices. The quantity and quality of data collected by several states from C&D processors has improved since 2002, particularly in Maine and New York. In addition, NEWMOA did not scrutinize the 2002 data to the same extent as the 2006 data, and processing facilities were not contacted. Therefore, the 2002 data is less reliable and is referenced in this Report where it adds to the understanding of changes in C&D waste generation and management.

Another useful source of C&D waste information that is referenced throughout this Report is the DSM Environmental Study, *2007 Massachusetts Construction & Demolition Debris Industry Study*,[5] prepared under contract to the Massachusetts Department of Environmental Protection. DSM Environmental surveyed several C&D waste characterization studies and summarized the results.

NEWMOA followed its approved Quality Management Plan in preparing this Report. The plan provides detailed procedures for ensuring that data compiled, analyzed, and presented by the Association is of the highest quality. In particular, the Association staff shared drafts of the Report with members of the NEWMOA Construction and Demolition Waste Workgroup and the NEWMOA Board of Directors for review and comment prior to publishing. The C&D Waste Workgroup consists of representatives of the environmental agencies for each of the NEWMOA-member States and its members are identified in the Acknowledgements on page ii of this Report.

[4] www.newmoa.org/solidwaste/cd.cfm
[5] www.mass.gov/dep/recycle/reduce/07cdstdy.pdf

Northeast Construction & Demolition Waste

Management of construction and demolition waste is regional in the Northeast. All states import and/or export C&D wastes, and states are interdependent for waste management services. This Section summarizes the available C&D waste generation, disposal, and processing data for the Region and concludes with a discussion of recycling and reuse markets.

C&D Waste Generation

Table 2 presents C&D waste generation for each state based on data reported to state environmental agencies by facilities that handle these wastes. The generation data combines the quantity of waste that was received directly for disposal and the quantity received by processing facilities from that state. Information supplied by other states was used to refine and further clarify the quantities sent out-of-state for disposal or processing.[6] Total C&D waste generation in the NEWMOA-member states in 2006 is estimated to be 12,039,646 tons.

Table 2
Estimated C&D Waste Generation in the Northeast in 2006

State	C&D Waste Generation (tons)	Per-capita (tons per person per year)
Connecticut	1,466,371	0.42
Maine	515,528	0.39
Massachusetts	1,858,151	0.29
New Hampshire	442,301	0.34
New Jersey	1,877,257	0.22
New York	5,530,655	0.29
Rhode Island	202,161	0.19
Vermont	147,222	0.24
Total	**12,039,646**	

Table 2 Notes:
Connecticut: in practice, data could include bulky waste that is not C&D.
Maine: out-of-state waste could be reported by Maine facilities as waste generated in Maine and/or reported as MSW instead of C&D at the Maine facility.
Massachusetts: more waste from Massachusetts might go to Maine and New Hampshire than officially reported by facilities in those states (see Maine and New Hampshire notes).
New Hampshire: out-of-state waste could be reported by New Hampshire facilities as waste generated in New Hampshire and/or reported as MSW instead of C&D waste at the New Hampshire facility.
New Jersey: only disposal data was available, and therefore generation does not include the quantity recovered from processing.
New York: some C&D waste might be direct-hauled to Pennsylvania for disposal or processing, and those quantities are unknown by NYSDEC.
Rhode Island: some management of C&D waste in Rhode Island might not occur at regulated facilities.
Vermont: C&D waste activity per person is likely to be lower in Vermont due to its lack of multiple large urban areas when compared to the other NEWMOA-member states.

[6] The state-specific Sections in the Appendices provide more information on how waste generation totals were determined for each state.

Table 2 normalizes C&D waste generation by population, and shows that the per-capita generation of C&D waste varies widely among states from roughly 0.19 to 0.42 tons per person per year. The DSM Environmental Study on C&D waste reported that on average C&D waste generation is 1.7 pounds per person per day, which translates to 0.31 tons per person per year.[7] Table 2 includes notes to explain the state differences from this estimated average.

The DSM Environmental Study also estimates average C&D waste composition percentages by weight, and these are shown in Table 3. The analysis focused on six C&D wastes that the researchers considered to have the greatest opportunity for recovery: plastics, metals, ABC, drywall, roofing, and wood. As shown in Table 3, wood waste makes up the largest portion of the C&D waste stream, followed by "other", roofing (asphalt shingles), drywall (gypsum), and ABC. The Study further divides drywall and wood waste into construction generated and other "clean" wastes, and demolition/renovation and other "dirty" wastes categories. Table 3 also presents estimates of the quantities of each waste component that might be generated in the Northeast based on the composition percentages and the C&D waste generation data presented in Table 2. The material generation quantities in Table 3 are estimates, and provide a reference for estimating current levels of material recovery and the potential to increase recovery.

Table 3
Estimated C&D Waste Characterization

Material	Percentage by Weight*	Estimated Quantity Generated in the Northeast** (tons)
Plastics	2	240,793
Metals	5	601,982
Concrete and Rubble (ABC)	9	1,083,569
Drywall		
Construction (clean)	6	722,379
Demolition/Renovation (dirty)	4	481,586
Roofing	11	1,324,361
Wood:		
Unadulterated (construction scraps and pallets)	11.5	1,384,559
Adulterated (painted and engineered)	20.9	2,516,286
Treated (pressure-treated)	1.6	192,634
Other	29	3,4914,973

* Percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study.*

** Determined using the estimated generation data presented in Table 2.

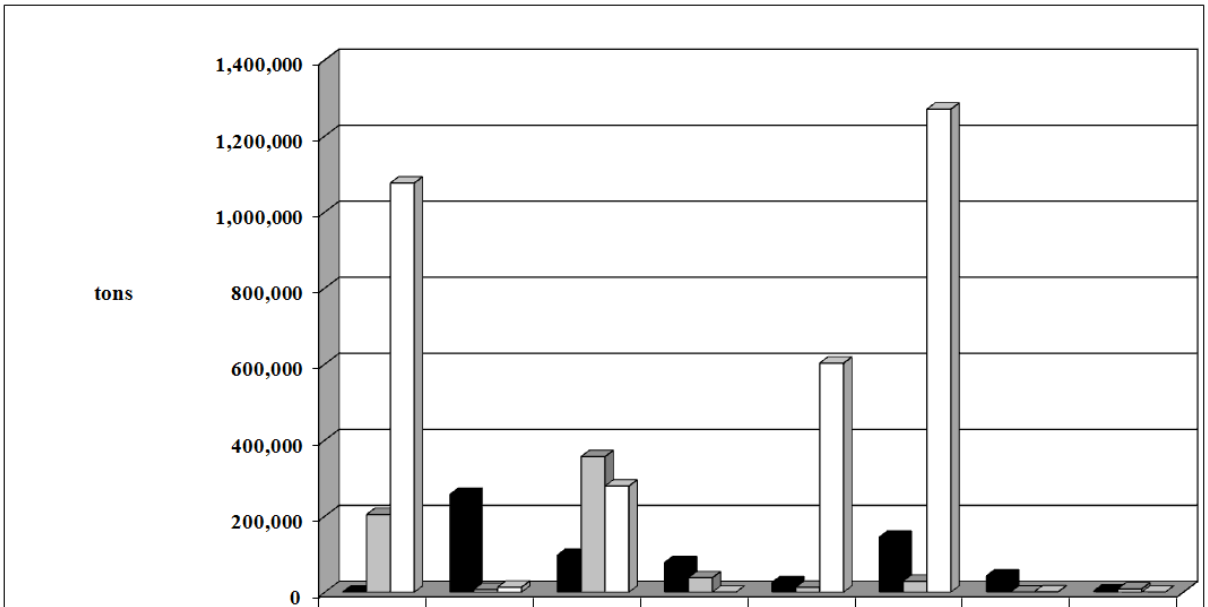
[7] DSM Environmental, *2007 Massachusetts Construction & Demolition Debris Industry Study.*

C&D Waste Disposal

C&D waste is mainly disposed in landfills – either landfills permitted just to receive C&D waste, or landfills that receive primarily municipal solid waste (MSW). Due to its relatively low BTU content, C&D waste is generally not managed at waste-to-energy (WTE) facilities, and these facilities do not accept loads containing only C&D materials. However, C&D waste generated by small homeowner projects can end up mixed with MSW and sent to WTE facilities where it is reported as MSW. Therefore, the quantity of C&D managed at WTE facilities is not included in the data presented in this Report.

All NEWMOA-member states import and/or export C&D waste for disposal. Figure 1 presents C&D waste disposal imports and exports for each state in 2006. Maine and New Hampshire are net importers of C&D wastes for disposal. Connecticut, Massachusetts, New Jersey, and New York are net exporters of C&D wastes for disposal and are reliant on export for disposal at facilities in non-NEWMOA states. Rhode Island and Vermont import or export only small quantities of C&D waste for disposal.

Figure 1:
2006 C&D Waste Imports and Exports for Disposal
(tons)

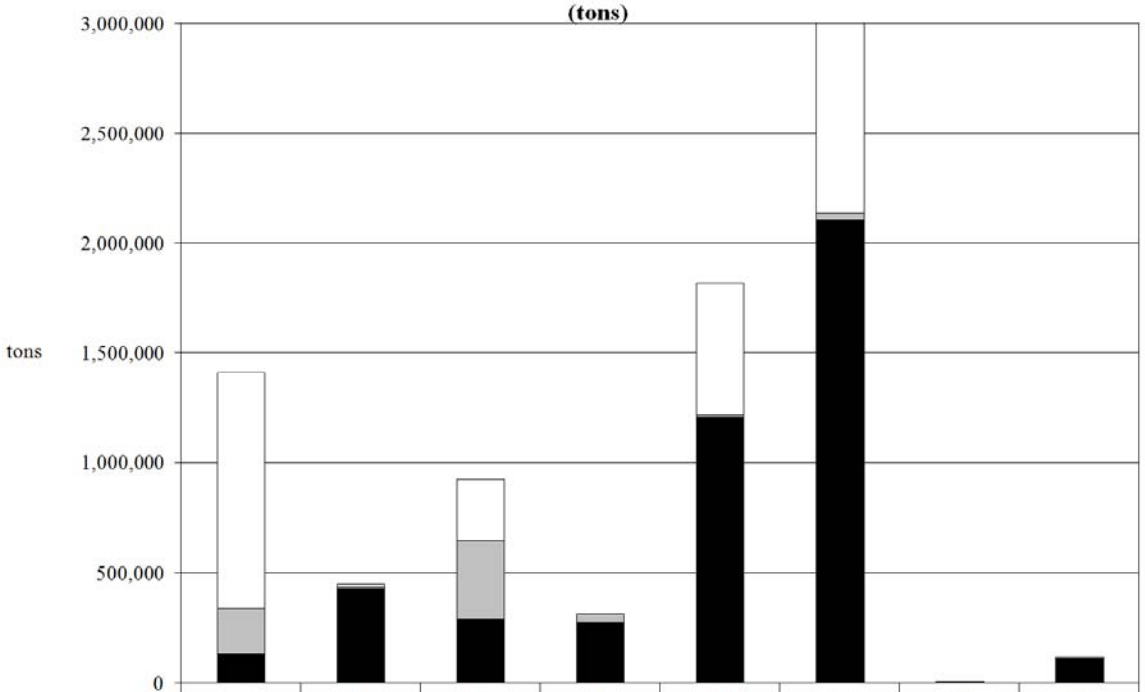


	CT	ME	MA	NH	NJ	NY	RI	VT
Imports from NEWMOA States	332	256,952	97,115	77,917	25,280	144,563	43,085	3,213
Exports to NEWMOA States	204,092	7,070	356,558	37,941	12,707	28,690	84	8,385
Exports to non-NEWMOA	1,076,079	13,097	279,113	0	602,193	1,270,423	800	0

The total quantity of C&D wastes generated in the NEWMOA-member states that was disposed in 2006 was 8,465,691 tons, or 70 percent of the total estimated C&D waste generation. Figure 2 presents the total quantity of C&D waste generated by each state that was then disposed and where it was disposed. The majority of the C&D waste generated by Maine, New Hampshire, New Jersey, New York, Rhode Island, and Vermont that was disposed was sent to in-state landfills. The majority of C&D wastes generated in Connecticut and Massachusetts that was

disposed in 2006 was exported. In-state landfills disposed one-third or less of the C&D waste generated in those two states.

Figure 2:
2006 C&D Waste Generated by State and Disposed
(tons)



	CT	ME	MA	NH	NJ	NY	RI	VT
Exports to non-NEWMOA	1,076,079	13,097	279,113	0	602,193	1,270,423	800	0
Exports to NEWMOA States	204,092	7,070	356,558	37,941	12,707	28,690	84	8,385
Disposed of In-State	134,522	430,682	290,388	277,417	1,204,632	2,108,704	9,792	112,322

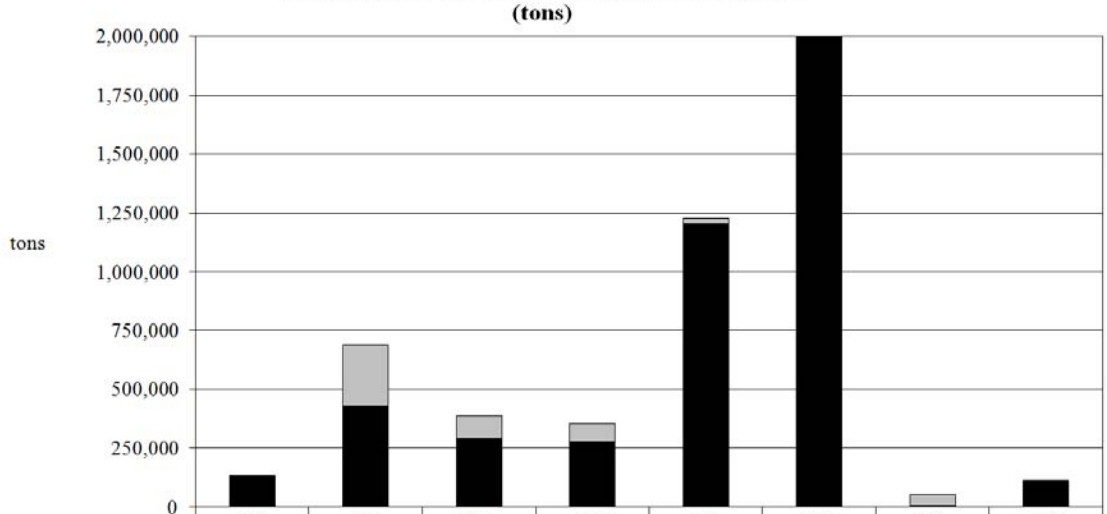
The disposal estimates presented in Figures 2 for Maine, New Hampshire, Massachusetts, New York, Rhode Island, and Vermont do not include C&D wastes that are used as alternative daily cover (ADC) at landfills in those states.[8] ADC is produced from processing and as discussed in the next section, processors take-in C&D waste from out-of-state, making the state-specific origin of ADC produced difficult to attribute. New Jersey does not collect alternative daily cover data from their landfills. Connecticut exported the vast majority of its C&D wastes out of the NEWMOA region in 2006 and does not know if any was used as ADC. Therefore, a portion of the C&D waste reported as disposed for Connecticut and New Jersey could have been used as ADC. The production and use of ADC in each state is discussed in more detail in the C&D Waste Processing Section below and also in the state-specific Appendices.

Figure 3 presents the quantities of C&D waste that is disposed in each state and where it came from (not including ADC). New Jersey and New York were the only states with facilities reporting C&D waste disposal from non-NEWMOA states, and the quantity was negligible compared to overall disposal. Maine, and to a lesser extent Massachusetts, New Hampshire, and

[8] If ADC had been included in disposal estimates in Figure 2, they would be significantly higher: an additional 38,094 tons for Maine, 584,371 tons for Massachusetts, 125,850 tons for New Hampshire, 622,504 tons for New York, 176,159 tons for Rhode Island, and 12,598 tons for Vermont in 2006.

New York, are the states that report that a significant portion of the C&D waste disposed at facilities in the state originated from out-of-state in 2006. More detail on the origins of the C&D waste disposed in each state is presented in the state-specific sections of the Appendices.

Figure 3:
Total Quantity of C&D Waste Disposed of In-State
(tons)



	CT	ME	MA	NH	NJ	NY	RI	VT
Imports from Non-NEWMOA	0	0	0	0	718	90,459	0	0
Imports from NEWMOA States	332	256,952	97,115	77,917	25,280	144,563	43,085	3,213
In-state Generated Waste	134,522	430,682	290,388	277,417	1,204,632	2,108,704	9,792	112,322

The use of ADC produced from C&D waste at landfills is also not included in Figure 3. As discussed above definitively determining the state-specific origin of the ADC used in a state is not possible. More data on ADC use is presented in the following Section.

C&D Waste Processing

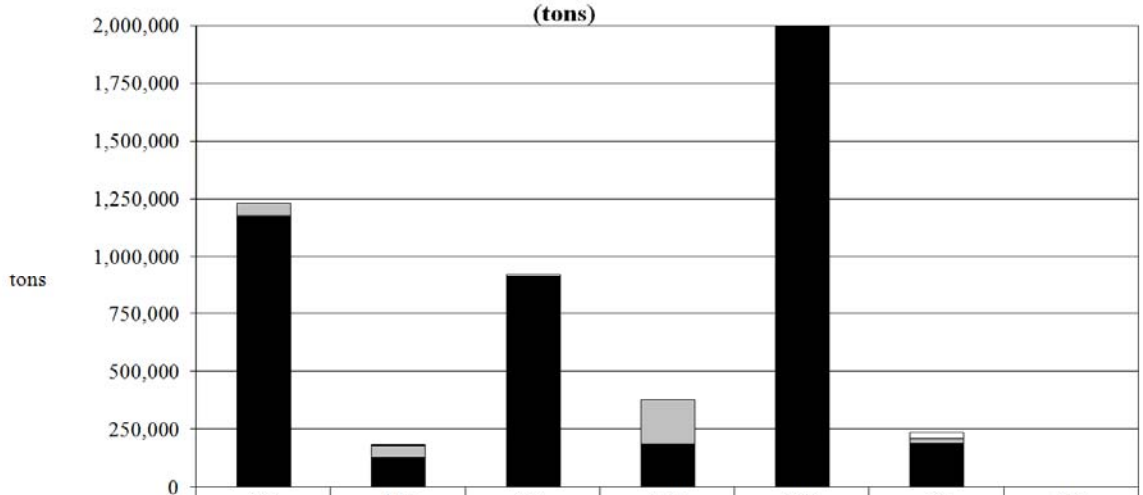
C&D waste processing facilities take in mixed C&D wastes and recover for reuse, recycling, and/or end use at least a portion of the material. However, there is wide variability in how wastes are handled at these facilities and the quantity and types of materials that they recover. At the low end of the processing spectrum, there are some facilities where mixed C&D wastes are tipped onto the ground outdoors, the metals are removed, and the remaining material is run-over and pushed around by a bulldozer to reduce its volume and then loaded into a truck or railcar for transport for disposal or use as ADC at a landfill. At other facilities, the tipping and processing areas are entirely enclosed and an automated system, supplemented by manual picking, is used to separate out several different materials for reuse and recycling. Even these sophisticated processing centers generate materials that cannot be recycled, which are often designated as "residuals" and "fines" that were commonly used as ADC in 2006. There is no common standard as to how C&D wastes are processed at facilities in different states or even within a single state.

With the exception of Vermont, all states have commercial facilities that process C&D wastes and recover materials for reuse, recycling and/or end use. Due to its small size and relatively rural nature, C&D waste processing has not proved to be an economically viable business in

Vermont. New Jersey has facilities that process C&D wastes; however, data specific to C&D waste processing is not available for New Jersey for several reasons. New Jersey disposal facilities that are permitted to cull recyclables from incoming waste, known as materials recovery facilities do not distinguish in their record-keeping systems how the material received was generated. Furthermore, in New Jersey, recycling centers for components of the construction and demolition waste stream are required to keep records of the amount of material received by municipality of origin; however, they are not required to specify whether the material was generated by a construction or demolition project as opposed to a road/bridge project or a land-clearing project.

As shown in Figure 4, with the exception of New Hampshire, C&D processing facilities in the Region handled mainly waste generated in-state in 2006. Figure 4 also shows that facilities in each state do import and/or export some C&D waste for processing. In Connecticut, Massachusetts, New York, and Rhode Island virtually all C&D waste generated enters a processing facility; whereas in Maine, New Hampshire, and Vermont, a significant portion of the C&D waste that is generated within the state is disposed without handling at a processing facility. New Jersey does not have processing data specific to C&D wastes, as discussed above and further in the New Jersey Section in the Appendices. While Vermont does not have any commercial C&D processors, one Vermont landfill did accept some C&D waste generated in New Hampshire and then ground it for ADC.

Figure 4:
2006 C&D Waste Inputs at Processors
(tons)

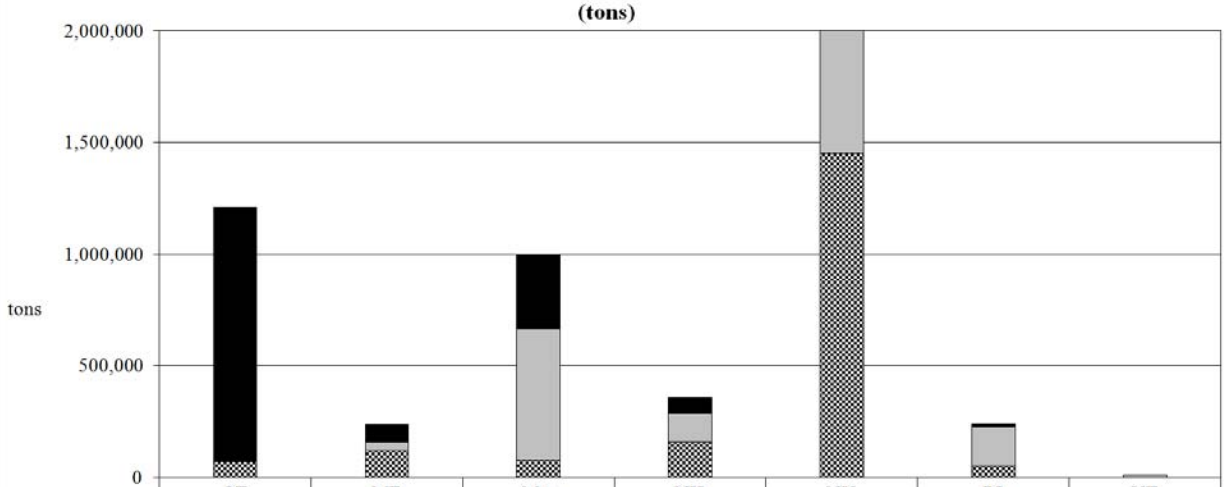


	CT	ME	MA	NH	NY	RI	VT
Imports non-NEWMOA	0	68	0	0	148	28,810	0
Imports NEWMOA States	57,094	53,524	12,646	194,000	85,387	20,000	864
In-State Generated	1,177,742	130,429	913,244	187,111	4,209,987	190,163	0

In 2006, the majority of C&D waste processed was ultimately disposed or used in the landfill environment as alternative daily cover as shown in Figure 5. Waste programs in some states consider ADC a form of diversion and include the data in their estimates of recovery quantities. However, in this Report, ADC is not considered diversion or recovery and is reported separately as "landfill uses." If the available data on disposal and landfill uses are combined, the quantity

of C&D waste that is processed and ends up in the landfill environment ranges from 94 percent in Connecticut to 34 percent in Maine.

Figure 5:
2006 C&D Waste Processor Outputs
(tons)



	CT	ME	MA	NH	NY	RI	VT
Disposal	1,139,723	79,204	334,224	71,196	2,125,442	10,592	0
Landfill Uses	0	38,094	584,371	125,850	622,504	176,159	12,598
Recovered	71,062	121,327	79,537	159,904	1,452,670	52,868	0

As shown in Figure 5, facilities in Maine, New Hampshire, and New York recover, for uses other than ADC, a significant portion of processed C&D waste: 66, 42, and 34 percent, respectively. C&D waste processing facilities in Maine and New Hampshire are particular about the incoming materials they accept, and, therefore, are able to recover a large portion of the incoming wastes. However, in Maine and New Hampshire, a significant portion of C&D waste generation is sent for disposal without prior processing. New York C&D waste processing facilities, particularly those near urban areas also receive ABC from road projects, and that affects their estimates of aggregate quantities recycled. The New York processors contacted by NEWMOA staff were not able to estimate the portion of incoming C&D waste that they were handling from road projects and, therefore, these materials could not be removed from the estimates presented in this Report.

As shown in Figure 4, C&D waste processing facilities in each of the NEWMOA-member states receive some out-of-state material. Once material enters a C&D waste processing facility, correlating output quantities to state of origin is not possible. Therefore, from the available data the percentage of C&D waste generated by a single state that is recovered for reuse or recycling cannot be determined. For the New England states only, 484,698 tons of material was recovered, or about 10 percent of the estimated total C&D waste generation (4,631,734 tons) in 2006. As mentioned above, C&D waste data from New Jersey and New York processors is not as specific about C&D processing, particularly for ABC, as data from the New England states. This is also explained further in the New Jersey and New York state-specific Appendices.

Markets for Processed C&D Materials

The constituents of C&D waste that are currently marketable include: metal, wood, ABC aggregate, gypsum wallboard, asphalt shingles, plastic, and cardboard. More information on

each of these materials and how they are reused or recycled is presented at the end of this Section. Table 4 presents a summary of the categories of material-specific data on C&D waste recovery that each state environmental agency shared through NEWMOA.[9]

Table 4
C&D Waste Recovery: Data Provided for C&D Waste Processing Facilities on Specific Materials for Recovery by State

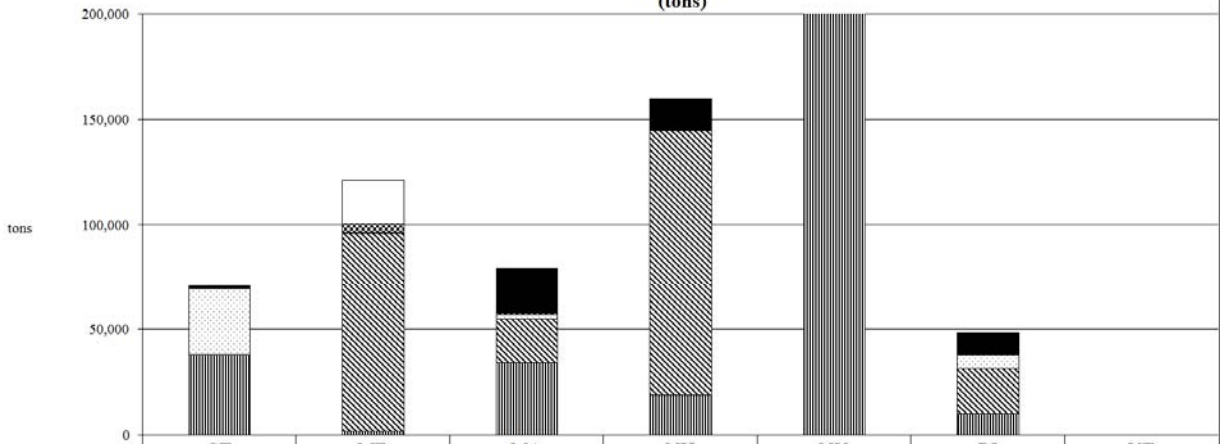
C&D Wastes Recovered	CT	ME	MA	NH	NY	RI
Metal	X	X	X	X	X	X
Clean Wood	X	X	X		X	X
Wood Fuel Chip		X	X		X	X
Aggregate	X		X		X	X
Gypsum		X	X		X	
Asphalt Shingles		X				
Plastic	X		X		X	
Cardboard	X		X		X	X
Clean Fill	X				X	

Plastics and cardboard recovered from C&D wastes were reported by some states, but not by most. In addition, for Massachusetts, the data reported on these wastes was often from facilities that recycle both MSW and C&D waste, and the portion of plastic or cardboard from C&D debris is not known. Therefore, plastic and cardboard data is not included in this Report. Data on recovery of clean fill from C&D whole processors is also not covered in this Report.

Figure 6 presents the types and quantities of materials recovered by each state in 2006. The materials reported as recovered included ABC aggregates, asphalt shingles, gypsum, clean wood, wood fuel chip, and metal. In 2006, C&D wood processed into wood fuel chip was the main material recovered by facilities in Maine and New Hampshire, and was a significant output from facilities in Massachusetts, New York, and Rhode Island. The other materials commonly recovered by facilities in 2006 were ABC aggregates, clean wood, and metal scrap. Markets for gypsum recovered from wallboard were starting to develop in 2006 and, therefore, most states did not collect this information. Asphalt shingle recovery and recycling has occurred in Maine for several years, but was just beginning in other states in 2006, and therefore, only Maine gathered this material-specific information.

[9] Vermont does not have a regulated C&D waste processing facility, and useable data was not available from New Jersey as discussed further in the New Jersey state-specific Appendix. NEWMOA obtained more detail for New Hampshire materials by contacting C&D waste processors directly.

Figure 6:
2006 C&D Waste Processor Recovered Outputs
(tons)



	CT	ME	MA	NH	NY	RI	VT
Asphalt Shingles	0	20,656	0	0	0	0	0
Aggregate - ABC	1,444	0	21,853	15,200	637,476	10,491	0
Gypsum	0	4,052	598	0	35,085	0	0
Clean Wood	31,644	64	2,031	0	160,098	6,305	0
Wood Fuel Chip	0	94,678	20,769	125,500	135,755	21,650	0
Metal	37,974	1,877	34,286	19,204	211,158	9,951	0

Table 5 compares the C&D waste quantities recovered as reported by facilities in the NEWMOA-member states for 2006 versus the generation estimates for various C&D wastes that were presented in Figure 3.

As the data in Table 5 shows, in 2006 there was a significant difference between the quantity of C&D materials generated and the quantity recovered, indicating potential opportunities to significantly increase recovery of C&D wastes. The most common materials recovered from C&D debris and their potential uses are ABC, asphalt shingles, gypsum wallboard, metals, wood, and other (corrugated cardboard and plastics), and these are discussed below.

Table 5 2006 Estimated C&D Waste Recovery in the Northeast			
Material	**Estimated Quantity Generated in NEWMOA Region (tons)**	**Quantity Recovered by Processors in NEWMOA Region in 2006 (tons)**	**Difference**
Plastics	240,793	NA	NA
Metals	601,982	314,450	287,532
Concrete & Rubble (ABC)	1,083,569	686,464*	397,105*
Drywall			
Construction (clean)	722,379	39,735	682,644
Demolition/Renovation (dirty)	481,586	0	481,586
Roofing	1,324,361	20,656	1,303,705
Wood:			
Unadulterated (e.g., construction scraps, pallets)	1,384,559	200,142	1,184,417
Adulterated (e.g., painted, engineered)	2,516,286	398,352	2,117,934
Treated (e.g., pressure-treated)	192,634	NA	NA

NA = Not Available

*637,476 tons was reported by New York. As explained further in the New York state-specific Appendix, the New York recovery data most likely includes ABC generated from road and bridge projects, which skews the New York and regional data. If NJ and NY are removed, the estimated quantity of ABC generated for New England states is 419,190 tons, recovered is 48,988, and the difference is 370,202 tons.

Asphalt, Brick, & Concrete (ABC)

As discussed further in the state-specific sections in the Appendices, ABC is considered inert and can be crushed and reused on-site for fill. Because ABC is heavy and costly to transport, on-site management is common. ABC that is mixed with other C&D wastes is typically separated and ground at C&D waste processors, and then made available for use as aggregate. ABC aggregate can replace stone and gravel in such applications as road base material. However, recovered ABC aggregate is heavy and costly to transport, and the virgin material it replaces is relatively inexpensive. Therefore, the market for ABC aggregate from C&D waste processors is not likely to grow unless the price of crushed stone and gravel increases significantly. C&D waste processors typically do not charge users for aggregate, and they often require customers to come to their facility to pick up the material. The benefit to processors is that they do not have to pay the disposal fee for the material. In cases where ABC is used as alternative daily cover (ADC) at landfills, the processor must pay the landfill, although at a lower per ton fee than for disposal. As a result, the processors can benefit by minimizing the tonnage of ABC that must be transported to a landfill.

C&D waste processors in Connecticut, Maine, New Hampshire, New York, and Rhode Island report producing ABC aggregate for reuse. In Connecticut, producing ABC aggregate is not widespread among C&D waste processors, and the quantity reported in 2006 was less than 1,500 tons. As discussed above, the large quantities of ABC aggregates reported by New York C&D

waste processors indicates that much of the material is produced from road and bridge projects – a source of material excluded from the analysis in this Report to the extent possible. Massachusetts and New Hampshire C&D waste processors report that it is often difficult to find users for the aggregate they produce.

ABC is a component of mixed C&D waste and can be recovered for reuse. However, due to its weight and the low cost of other aggregates, processors usually do not generate income from such recovery – other than the avoided cost of disposal.

Asphalt Shingles

Post-consumer asphalt shingles, known as tear-offs, are generated from re-roofing jobs and tend to be produced as a segregated waste stream. As with ABC, asphalt shingles are heavy, and their transport is costly. Recycled asphalt shingles can be used in the production of hot-mix asphalt, cold-patch asphalt, or new shingles, as well as for dust control on rural roads or as a road base component. Asphalt contains oil, and weathered shingles contain oil that can be cost-effective to recover when oil prices are high. Tear-offs can displace asphalt and aggregate in asphalt production. Before introduction, the shingles must be processed to the proper size and debris, including removing nails, wood, and felt paper. In addition to high transportation costs, the potential for asbestos contamination can be a barrier to tear-off recycling. Prior to the 1980s, some shingles and some of the felt paper liner contained asbestos, so now state programs require batch testing of these old shingles before reuse can occur to prevent cross contamination, further increasing recycling costs.

In 2006, with the exception of Maine, the NEWMOA-member state programs did not collect data on asphalt shingles because recycling was not yet occurring. However, since 2006 two facilities in Massachusetts and three in Connecticut began operating. These facilities, as well as a facility in Maine supply ground shingles to hot-mix asphalt producers for use in non-roadway projects, such as driveways and parking lots. The market for recycled tear-offs would significantly increase if the hot-mix asphalt with recycled tear-off shingle content was included in state highway specifications, particularly because municipalities default to the state specifications for their road projects.

Entities concerned with asphalt shingle waste have been working to affect change in state highway departments across the nation but have encountered reluctance. There is renewed emphasis on waste reduction at all levels of state government, and highway departments may become more open in the future. At a May 2008 meeting, the NEWMOA-member state environmental agencies identified increasing asphalt shingle tear-off recycling as a priority for a coordinated effort in the region. State environmental programs are encouraging the private sector, asphalt manufacturers, and C&D waste processors to engage state highway departments.

Gypsum Wallboard

Gypsum from wallboard has the following potential uses:

- as a replacement for a portion of virgin gypsum in making new wallboard,
- as a soil nutrient additive,
- as a replacement for virgin gypsum for cement manufacturing, and
- as a bulking/drying agent for sludge.

The first two applications are only suitable for new wallboard scraps – wallboard that has not been painted or otherwise adulterated. Wallboard from renovation and demolition projects might be coated with lead-based paint, and may be contaminated with asbestos from joint compound. Use of both of these materials was common on wallboard prior to the mid-1970s. Uses for potentially contaminated wallboard are limited to providing an ingredient in making cement and depending on the application, as a bulking/drying agent.

Virgin gypsum is a fairly inexpensive material. The cost of recovering gypsum from wallboard can be relatively significant, which creates an economic disadvantage in the marketplace for recovered gypsum. The key for the processor to economically recover waste gypsum is for the material to be segregated as early as possible – preferably prior to leaving the construction site. To promote these practices, some C&D waste processors have instituted differential pricing – charging less for loads that arrive pre-sorted and more for mixed C&D waste loads.

As the processor handles wallboard, it breaks and crumbles and becomes difficult to recover. As a result, the fines generated from C&D waste processing typically contain significant quantities of gypsum. When these fines are used as ADC, which is the only current outlet for the fine material (other than more costly disposal), the gypsum reacts in the landfill environment and generates hydrogen sulfide gas. This gas has a significant odor and can create a public health problem.

The benefit to C&D waste processors of removing gypsum for reuse/recycle is twofold: the avoided tonnage that they must pay to landfill the material; and more importantly, a continued market for the residuals and fines that they produce. C&D waste processors always end up with a quantity of fines and residuals that they must manage. The fee for use as ADC is less than the fee for disposal. However, in 2007 many landfills stopped accepting C&D fines and residuals for ADC because of the resulting hydrogen sulfide gas problems. If gypsum wallboard is removed prior to processing, gypsum content in the fines and residuals is minimal, and landfills can again accept C&D fines for ADC.

Producing gypsum powder from wallboard waste requires specialty equipment that removes the paper and grinds the gypsum to a uniform size that manufacturers can use. The paper produced from wallboard recycling is typically used for animal bedding or as a compost additive. For most of 2006, gypsum wallboard recycling in the Northeast was limited to new wallboard scraps handled at three facilities:

- A C&D waste processor in New York, Taylor Recycling, that produced powder for use in the manufacture of new wallboard;
- A C&D processor in Maine, Commercial Paving and Recycling, that used crushed gypsum as a bulking/drying agent for a road base product; and

- A wallboard manufacturer in New Hampshire, GP Gypsum, that accepted unprocessed new wallboard scrap hauled directly to their facility, and added the crushed wallboard into its manufacturing process.

At the end of 2006, a processor, Gypsum Recycling America (GRA) that specializes in recycling gypsum wallboard began operations in Massachusetts. Since that time, GRA has expanded its relationships with existing C&D waste processors and handles the wallboard they segregate. However, due to a variety of economic and logistical factors, GRA has operated at significantly below permitted capacity.

In 2008, Commercial Paving received a beneficial use determination (BUD) from the Maine Department of Environmental Protection to include wallboard from renovation and demolition projects in its bulking/drying agent product, providing the first market for this material in the Northeast.

The costs of segregation, collection, transport, and processing, combined with the low cost of virgin gypsum, makes recycling a large percentage of gypsum wallboard waste in the Region a challenge. Users of recycled gypsum need to be expanded, including for renovation and demolition wallboard. For example, to take advantage of their BUD, Commercial Paving needs an expanded market for the large quantities of their product. In addition, the economics of collection and transport of waste demolition/renovation wallboard from throughout the Northeast to the Maine facility need to improve; or other processors and/or users of demolition/renovation wallboard in other locations need to develop.

At a May 2008 meeting, the NEWMOA-member state environmental agencies identified increasing gypsum wallboard recycling as a priority. NEWMOA was subsequently able to develop a project that began in the fall of 2008. This interstate effort is designed to develop joint initiatives that would create a larger and more stable supply of gypsum for recycling operations than might result from individual state actions. Consistency of approach across states would "level the playing field" for generators and processors of gypsum wallboard wastes and increase their overall environmental performance. The project is ongoing with results expected by the end of 2009.

<u>Metals</u>

Scrap metal recovery and recycling has a long history and established markets. Metals are heavy, making their transport and disposal expensive. While the price for scrap metal varies, there has been enough speculation to make segregation and recycling financially attractive. In 2006, metals recovery by C&D waste processors was over 50 percent of the total estimated potential generation from C&D waste projects. Recovery rates may actually have been greater than 50 percent, as metal could also have been removed for recovery directly from the construction site prior to its transport to a C&D waste processor.

<u>Wood</u>

There are two types of C&D wood waste: unadulterated and adulterated. Unadulterated (often called clean) wood is generated during land clearing for new construction. Lumber scraps and used wood pallets are also considered clean wood waste.

Adulterated (often called dirty) wood waste has been painted or treated and is generated mainly in renovation and demolition projects. If properly segregated, clean wood can have a relatively high value for use as landscaping mulch. However, in practice distinguishing between clean and dirty wood can be difficult, making economic segregation of mixed C&D wood waste challenging. C&D wood waste can be attractive for use as a fuel, particularly when traditional fuel prices rise. C&D wood fuel chip tends to be dry and, therefore, has a higher BTU (British Thermal Units) value than forested wood chips.

In 2006, the markets for C&D wood waste were in turmoil in the Northeast. Maine was the primary market for C&D wood waste in the Region, but bio-mass boilers found that being eligible to sell renewable energy credits (RECs) to satisfy requirements of some states into which they sell power, notably Connecticut and Massachusetts, was more profitable than buying C&D wood fuel chip. In 2006, facilities that burn clean wood only were eligible for Connecticut RECs, but facilities that burn wood derived from C&D waste were not. This severely limited the market for C&D wood fuel chip in 2006. The REC market disincentive in Connecticut was corrected in 2007, and the market for wood fuel chip has since improved. In May 2006 new standards for C&D wood fuel chip burned in Maine facilities went into effect, requiring testing for heavy metals and limiting fines content, increasing processor costs.

Today there are markets for adulterated wood: biomass boilers in Maine and Quebec are permitted to use it, and a particle board manufacturer, Tafisa, based in Quebec also accepts it. The *2007 Massachusetts Construction & Demolition Debris Industry Study* estimated that the demand for C&D wood by the Tafisa boiler to be between 675,000 and 935,000 tons. In addition, there are energy generating facilities proposed for Connecticut and Massachusetts that would use C&D wood waste in the future. However, all these current and potential users have specifications for the wood chip that they will accept. These current end users of C&D wood waste report that they are unable to secure the quantities of C&D wood fuel chip at the quality specification that they need, and at a cost that is feasible. Therefore, the main barriers to increasing C&D wood waste recovery are a combination of the cost of processing the material, the quality required by the users, and the cost of consolidation and transport to these facilities. If those can be overcome by a processor, there appear to be current outlets for all of the material that could be produced.

<u>Corrugated Cardboard & Plastic</u>

Corrugated cardboard and plastic are the other C&D wastes that have potential markets. Both materials are part of the MSW waste stream and have been the focus of state and local MSW recycling efforts. Plastic and cardboard are mainly from packaging and are therefore associated with new construction projects. A C&D waste processor that also processes and recycles MSW is more likely to remove cardboard and plastic for recycling than a processor that does not. A MSW recycler would already have the handling equipment, storage capacity, and outlets for the material; whereas a C&D waste processor would likely not generate the quantities of material to make those investments. Cardboard and plastic are lightweight, making their disposal relatively inexpensive. Markets for cardboard and plastic are volatile. In 2006, prices were relatively high increasing the incentive to segregate these materials and recycle them. However, even in the relatively strong market in 2006, there were opportunities to increase recycling of plastic and cardboard.

Conclusions

This Report analyzes the data reported by C&D waste management facilities regulated by each of the eight Northeast states, and therefore is limited to the C&D waste quantities that pass through a regulated solid waste facility. The quantity of C&D waste generated in the Northeast in 2006 documented in this Report was 12,065,582 tons. A total of 1,937,368 tons of C&D waste materials were recovered in 2006. However, the generation and recovery estimates likely include some ABC from road and bridge projects in New York. In addition, quantities of C&D waste material recovery for New Jersey are not included in generation or recovery estimates. Of the C&D waste generated in the Northeast, 8,465,691 tons were disposed in 2006, and 1,559,576 tons were used as ADC. Therefore, a total of 10,025,267 tons of C&D waste went to a landfill in 2006. Combining the totals of disposal, use as ADC, and recovery data indicates that the fate of 102,947 tons of documented C&D waste generation in the Northeast is unknown – less than 0.85 percent.

The management of C&D waste in the Northeast is regional, with facilities in each state importing and/or exporting C&D waste to each other for processing and/or disposal. All of the Northeast states export a portion of C&D waste for disposal, with some states relying more heavily on export for disposal to manage their C&D waste than others. For example, Connecticut, Massachusetts, New Jersey, and New York send a significant portion of the C&D waste out-of-state for management. Massachusetts relied on facilities in other NEWMOA-member states for export, and Connecticut, New Jersey, and New York sent the majority of their C&D waste to facilities in non-NEWMOA states – primarily Pennsylvania and Ohio.

The Northeast states also depend upon each other for markets for the materials recovered by C&D waste processors. The primary example in 2006 was bio-mass boilers in Maine that were the primary outlet for the C&D wood recovered by processors throughout the New England states.

The materials recovered from C&D wastes in 2006 were confined primarily to metal, clean wood, wood fuel chip, and ABC aggregates. Asphalt shingles and gypsum wallboard were largely not recovered in 2006. Metal was the only C&D waste material recovered at a significant percentage of estimated generation in 2006. Reported data indicates that 53 percent of the estimated quantity of metal in C&D waste was recovered. The actual percentage is likely to be even higher since metals could have been recovered from job sites before they reached a regulated facility – and due to data limitations, the reported figures do not include metal recovery in New Jersey. In 2006, metals were the only C&D waste component that did not have potential for significant improvements for recovery. In 2006, the percentage of C&D material recovered compared to generation was 10 percent for the New England states.[10,11]

[10] C&D waste data from New Jersey and New York processing data is not as specific about C&D processing as the data from the New England states. This is also explained further in the New Jersey and New York state-specific Sections in the Appendices.

[11] This Report does not consider use of C&D fines and residuals for alternative daily cover (ADC) as recovery and instead reports ADC separately as a landfill use.

As detailed in the state-specific Appendices, in states where 2002 C&D waste data was available, overall generation of C&D waste increased from 2002 to 2006 by 32 to 86 percent. The documented quantity of material recovered also increased between 2002 and 2006; however, the percentage relative to generation did not increase during this timeframe.

States differ in how C&D waste is managed; however, the overall effect on the quantity recovered when compared to the quantity generated is remarkably similar across the Northeast states. In 2006 no Northeast state appears to recover C&D wastes, as a percentage of C&D generation, at a rate notably higher than the others. There are generally two C&D waste management scenarios that both produce the same overall result:

- Most C&D waste generated in the state is processed, and the percentage of incoming material recovered by processing facilities is relatively small; or
- Some C&D waste generated in the state is disposed without processing, and some C&D waste is processed and the percentage of incoming material recovered by C&D waste processors is relatively large.

For example, in four NEWMOA states, Connecticut, Massachusetts, New York, and Rhode Island virtually all of the C&D waste generated is sent to processing facilities, and little sent directly to landfill for disposal. However, processing facilities in these states recover low percentages of their input – just 5.8 percent in Connecticut, 8.6 percent in Massachusetts, and 2 percent in Rhode Island, with the rest entering the landfill for disposal or as ADC.[12] In two NEWMOA states, Maine and New Hampshire, significant quantities of C&D waste are sent directly to landfill for disposal, and a lower percentage to processing facilities. Processing facilities in those states recover a much higher percentage of the incoming material – 66 percent in Maine and 42 percent in New Hampshire - but when the higher quantities sent directly to landfill disposal are considered, recovery as a percent of generation is comparable to other states.[13]

The availability and quality of data regarding C&D waste management is not consistent among the Northeast states, making aggregation and comparisons difficult. However, in comparison with 2002, when NEWMOA last analyzed available C&D waste data, several states have made significant improvements in data reporting and collection, most notably Maine and New York. In 2002, disposal data was the only information that was available from Maine and New York. By 2006, both states had robust processing and recovery data. Connecticut and Massachusetts collected the most detailed C&D waste management data in both 2002 and 2006, but believe that the quality of the information improved during that time. New Hampshire and Vermont also report that data reporting has improved from 2002 to 2006. Rhode Island has a history of problematic C&D waste processing facilities that operate outside their regulatory authority making data collection and completeness difficult as discussed throughout this Report. Lastly, New Jersey has a data collection and reporting system that provides detailed information about recycling, however it is not specific to the origin of the material. NEWMOA worked with state regulatory programs and contacted some C&D whole processing facilities so that the 2006 data

[12] C&D processing data for New York most likely includes ABC from road and bridge projects as explained further in the New York state-specific Appendix.

[13] The recovery situation in New Jersey is unknown as discussed throughout this Report, and Vermont does not have processing facilities, and so virtually all C&D waste is sent for disposal.

presented in this Report accurately reflects C&D waste management in the Northeast in 2006, and the Report can be used to benchmark progress in improving C&D waste recovery in the future.

C&D Waste Management Changes Since 2006

Some major changes have occurred in C&D waste management since 2006 that should be acknowledged, although their effects on C&D waste disposal, processing, and materials recovery have not been determined. In 2007 and early 2008, the local economy was robust creating a large supply of C&D waste materials from building construction, demolition, and renovation projects,[14] and the world economy provided strong markets for many recovered materials, particularly metals and wood. Several new businesses opened during this time in the Northeast to process mixed C&D materials, as well as segregated materials, such as post-consumer asphalt shingles and new construction gypsum wallboard scraps. New markets for recovered materials have also emerged since 2006. However, late in 2008, the economy changed dramatically, reducing construction activities as well as markets for recovered materials,[15] and the financial viability of some C&D waste processing facilities became uncertain.

C&D waste material recovery maybe positively impacted by the US Green Building Council's Leadership in Energy and Environmental Design (LEED) certification program. Due to increased public awareness of the environment and energy costs, most new building construction projects want a LEED certification. Projects can earn points towards certification for using recycled products in construction and for recycling waste materials produced. The LEED certification process has the potential to exert positive pressure towards greater recovery, reuse, and recycling of C&D waste materials.

[14] According to the Federal Reserve Bank of Boston's Indicators Database, the index of contracts for new non-residential building construction in New England rose from 404.6 in March 2006 to 654.6 in March 2007 and 554.1 in March 2008, www.bos.frb.org/economic/neei/neeidata.htm#construction.

[15] According to the Federal Reserve Bank of Boston's Indicators Database, the index of contracts for new non-residential building construction fell to 258.4 in March 2009 compared to 554.1 in March 2008 and 404.6 in March 2006, www.bos.frb.org/economic/neei/neeidata.htm#construction.

State-Specific Appendices

Connecticut

All solid waste transfer stations and volume reduction facilities (VRFs) are required to report quarterly to the Connecticut Department of Environmental Protection (CT DEP). The reports contain monthly summaries of the amount, type, and source of material received and the monthly summaries of the amount, type and destination of material transferred. All waste-to-energy facilities (WTEs) and landfills are also required to report quarterly. Those reports contain monthly data on the type, amount, and origin of waste received for disposal.

According to the data submitted to the CT DEP, enhanced by review of reports from other NEWMOA-member states and processing facility sources, a total of 1,466,371 tons of C&D originated in Connecticut in 2006[1] and passed through a reporting solid waste facility. This estimate was up 56 percent from the 942,531 tons reported in 2002.[2] This increase is most likely due to a combination of better reporting to CT DEP by facilities that manage C&D wastes, and the increase in new construction and redevelopment that occurred in 2006 compared to 2002. For example, according to the Federal Reserve Bank of Boston's Indicators Database,[3] the value of construction contracts for residential and non-residential building increased by 54 percent between 2002 and 2006 in Connecticut.

C&D Waste Disposal

The amount of C&D or bulky waste originating in Connecticut that was disposed, either in Connecticut or elsewhere, was 1,414,676 tons in 2006, 96 percent of the total quantity generated that passed through a reporting solid waste facility. C&D waste generated in Connecticut and disposed in 2006 is shown in Table CT1.

Table CT1
2006 C&D Waste Generated in CT & Disposed

State	Disposal (tons)
Connecticut	134,522
Maine	17
Massachusetts	94,885
New York	107,393
Rhode Island	1,797
Non-NEWMOA States	1,076,079
TOTAL	**1,414,676**

[1] The 2006 generation estimate includes 98,824 tons disposed directly in Connecticut without processing, 1,177,742 tons sent for processing at Connecticut facilities, 176,129 tons sent for disposal out-of-state from Connecticut transfer stations, 12,552 tons received directly at Massachusetts processing facilities, and 1,124 tons received directly at New York processing facilities.

[2] NEWMOA, *Interstate Flow of Construction & Demolition Waste Among the NEWMOA States in 2002*, January 2005: www.newmoa.org/solidwaste/cd.cfm

[3] www.bos.frb.org/economic/neei/neeidata.htm#construction

In 2006, 95 percent of C&D waste generated in Connecticut that was disposed, was sent to facilities out-of-state for disposal, and with only 5 percent was disposed within Connecticut. 1,076,079 tons of C&D waste, or 76 percent of the total disposed was sent to facilities outside the NEWMOA region, primarily in Ohio. The remaining 19 percent of disposal occurred primarily at facilities in Massachusetts and New York.

Disposal facilities in Connecticut reported receiving 134,522 tons of C&D waste for disposal from Connecticut sources and only 332 tons from out-of-state, all from Massachusetts.

Comparison of 2002 & 2006 C&D Waste Disposal Data

C&D waste disposal reported in 2002 was 893,800 tons, 95 percent of total generation in Connecticut. In 2002, 162,043 tons was disposed at facilities in Connecticut, 18 percent of the total disposed. This is a higher percentage than the 5 percent in 2006. However, the absolute quantity of C&D waste disposed in Connecticut was roughly the same in both years. In 2002, Connecticut reportedly sent 145,049 tons of C&D waste to Massachusetts, 22,419 tons to New York, and 2,509 tons to Rhode Island for disposal, a total of 169,977, 19 percent of total disposal – the same percentage as in 2006. However, in 2006, the quantity of C&D waste sent for disposal at facilities in NEWMOA-member states as a group increased by 20 percent to 204,092 with less going to Massachusetts and more to New York than in 2002. Lastly, in 2002, 561,780 tons went to facilities outside the NEWMOA-region, which was approximately 63 percent of the total disposed[4] compared to 76 percent in 2006.

C&D Waste Processing

Most of the C&D waste that was disposed was first sent to a permitted volume reduction facility (VRF). Of the 1,170,561 tons sent for disposal at facilities outside Connecticut, only 176,129 tons, 15 percent did not go through a VRF and went through a transfer station instead. In 2006, there were 28 permitted VRFs in Connecticut, up from 14 in 2002. The total permitted capacity of VRFs was 13,027 tons per day (tpd) or 3,387,020 tons per year[5] in 2006, with facilities ranging from 25 tpd to 2,387 tpd. The total amount of C&D waste processed at Connecticut VRFs in 2006 was 1,234,836 tons, essentially double the 2002 total of 611,632 tons. As shown in Table CT1, the origin of most of the processed C&D is from in-state, with just 5 percent originating out-of-state.

Table CT2
2006 C&D Waste Inputs at CT Processors

State	**Origin of C&D Waste (tons)**
Connecticut	1,177,742
Massachusetts	48,428
New York	8,666
TOTAL	**1,234,836**

While the purpose of a VRF is to reduce volume for economical transport to out-of-state disposal facilities, VRFs do opportunistic segregation of valuable materials for recovery when feasible. Table CT3 shows the disposition of VRF outputs as reported to CT DEP in 2006 including

[4] Includes 62,932 tons which destinations are unknown but assumed to be out-of-region.
[5] Assumes the facilities operate 5 days a week, 52 weeks a year.

relative quantities of recovered materials. In 2006, VRFs recovered at total of 71,062 tons of material, less than 6 percent of the incoming material.

Table CT3
2006 C&D Waste Processors Outputs & Destinations

State	Recovered (tons)	Disposal (tons)
Connecticut	53,114	35,698
Maine	1,357	0
Massachusetts	962	66,677
New Jersey	2,274	0
New York	1,127	106,223
Rhode Island	11,831	1,779
Non-NEWMOA	0	929,346
TOTAL	**71,062**	**1,139,723**

Table CT4 provides detail on the types of material recovered from VRFs, the quantities, and location of the destination facility. As Table CT4 shows, the principle materials that were recovered in 2006 were metal and clean wood, with most of this material staying in Connecticut. The primary out-of-state destination for metal and clean wood was Rhode Island.

Table CT4
2006 C&D Waste Processors - Material Recovered & Destination

State	Clean Wood (tons)	Metal (tons)	Aggregate (tons)
Connecticut	20,713	31,089	1,312
Maine	1,357	0	0
Massachusetts	715	115	132
New Jersey	0	2,274	0
New York	1,127	0	0
Rhode Island	7,335	4,496	0
Non-NEWMOA	397	0	0
TOTAL	**31,644**	**37,974**	**1,444**

Comparison of 2002 & 2006 C&D Waste Processing Data

In 2002, the amount of C&D waste that was processed in Connecticut and then marketed was 48,436 tons compared to 71,062 tons in 2006. The quantity of clean wood recovered in 2002 was approximately the same as in 2006, 30,000 and 31,644 tons, respectively, so most of the increase in the total quantity recovered between 2002 and 2006 was due to the increase in the quantity of metals recovered from 5,000 tons to 37,974 tons, respectively.

Markets for Recovered C&D Material

As discussed above, most of the recovered material in Connecticut was clean wood and metal. Table CT5 presents estimates of the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in Connecticut in 2006; and the difference.

Table CT5
Estimated 2006 C&D Waste Materials Generated & Recovered in Connecticut

Material	Generated in Connecticut (estimated tons)*	Recovered in Connecticut (tons)	Difference (tons)
Plastics	30,039	NA	30,039
Metals	75,097	37,974	37,123
Concrete and Rubble (ABC)	135,175	1,444	133,731
Drywall			
Construction (clean)	90,117	0	90,117
Demolition/Renovation (dirty)	60,078	0	60,078
Roofing	165,214	0	165,214
Wood:			
Unadulterated (e.g., construction scraps, pallets)	172,724	31,644	141,080
Adulterated (e.g., painted, engineered)	313,907	0	313,907

* Calculated based on the percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this report) multiplied by the total quantity of C&D waste generated in Connecticut in 2006.

From the information contained in Table CT5, there is potential to increase recovery of most marketable materials in Connecticut. Data on plastic recycling from C&D projects was not available. Some ABC was likely recovered because aggregate is generally processed at facilities that were not regulated by CT DEP in 2006 and therefore did not report data to CT DEP. Lastly, at least a portion of the unadulterated, "clean" wood could be recycled or composted at facilities that do not report it as C&D waste. CT DEP also did not report clean wood chip sent to Connecticut Resource Recovery Facilities (i.e., waste to energy facilities) as "recovered" and considered it disposal.

Since 2006, CT DEP has issued a beneficial use determination for post-consumer asphalt shingles at two or three facilities in Connecticut, enabling a market for this material to begin to develop. In addition, there is a proposal to build a facility to convert C&D wood waste to energy. However, the relatively low cost of the current practice of volume reduction and shipment out-of-state for disposal presents a challenge to increasing recovery of C&D waste materials in Connecticut.

Data Caveats

There are sources and uses of C&D waste that are not included in the data presented in this Report. For example, Connecticut allows construction and demolition projects to crush C&D rubble (for example, brick, concrete, and/or asphalt) on-site and reuse the aggregate on-site as a sub-base and/or backfill material. The quantity of C&D material reused on-site is outside the regulatory reporting system and is therefore not available. In addition, there is no reporting requirement for C&D waste that is transported directly out-of-state from a project site.

In addition, the placement of clean fill is exempt from state solid waste regulation. Clean fill is defined in Section 22a-209 of the Regulations of Connecticut State Agencies as natural soil, rock, brick, ceramics, concrete, and asphalt paving fragments, which are virtually inert and pose neither a fire threat nor a pollution threat to ground or surface water.

In 2006, Connecticut solid waste facilities did not have consistent categories for reporting C&D waste. Some solid waste facilities, such as landfills and transfer stations included C&D waste in their "bulky waste" tonnages, and other facilities, such as VRFs reported "C&D" waste as a distinct category. As a result, some Connecticut solid waste facilities often recorded C&D waste as bulky waste along with other common bulky wastes such as carpet, furniture, and appliances. Therefore, in this Report bulky waste information is used as a proxy for C&D waste generated in Connecticut. As a result, the data presented in this Report for the Northeast states is reasonably comparable, with the caveat that C&D waste estimates for Connecticut may contain some material that other states do not include.

Maine

C&D Processing facilities and C&D waste landfills in Maine are required to submit an annual report to the Maine Department of Environmental Protection (ME DEP) that includes a summary of the incoming wastes as to the type, quantity, date received, state of origin, and for the outgoing processed materials for the secondary materials (by-passed wastes and residues), the quantity in tons of those secondary materials, date removed from the facility and the physical location of the disposal of those wastes. According to this data, enhanced by review of reports from other states and processing facility sources, a total of 515,528 tons of C&D waste was generated in Maine in 2006.[1] A comparison of 2006 and 2002 C&D waste generation is not possible because the 2002 data set available from Maine was not complete. In 2002 facilities that processed and/or disposed of C&D waste in Maine were not required to report the state of origin of the incoming waste.

C&D Waste Disposal

In 2006 a total of 450,849 tons, or 87.5 percent of Maine-generated C&D waste was disposed, nearly all at Maine facilities, as shown in Table ME1. 20,167 tons was sent out-of-state to landfills in New Hampshire and in New Brunswick, Canada. Of the 450,849 tons that were disposed, 371,645 tons, or 82 percent was sent directly for disposal without prior processing.

Table ME1
2006 C&D Waste Generated in ME & Disposed

State	**Disposal (tons)**
Maine	430,682
New Hampshire	7,070
Non-NEWMOA States/Provinces	13,097
TOTAL	**450,849**

There were 28 landfills in Maine that reported receiving C&D wastes with most handling relatively small quantities. In 2006, there were 19 landfills that accepted only C&D wastes, and 9 landfills that received C&D wastes as well as other wastes, such as municipal solid waste (MSW). Of these mixed waste landfills, three received over 100,000 tons of C&D waste in 2006. Of those, one accepts mainly out-of-state waste, primarily from Massachusetts, and the other two service Maine primarily, or exclusively.

The total quantity of C&D waste disposed at Maine facilities in 2006 was 687,634 tons. Table ME2 presents the breakdown of the C&D waste received by state of origin. Approximately, one third of the C&D disposed in Maine in 2006 was generated out-of-state, primarily in Massachusetts.

[1] The 2006 C&D waste generation estimate includes 371,645 tons disposed directly in Maine without processing, 130,429 tons reportedly processed at Maine facilities, and 13,454 tons reportedly received by New Hampshire processing facilities.

Table ME2 2006 Origin of C&D Waste Disposed in ME	
State	**C&D Waste (tons)**
Connecticut	17
Maine	430,682
Massachusetts	220,600
New Hampshire	36,076
New York	197
Rhode Island	62
TOTA	**687,634**

C&D Waste Processing

The amount of C&D waste reportedly processed in 2006 at Maine facilities was 183,991 tons, of which 130,399 tons, or 70.9 percent was generated in Maine as shown in Table ME3. Facilities in Massachusetts and New Hampshire also sent C&D to Maine for processing, along with a small quantity from New York. ME DEP generally does not set daily tonnage limits for C&D processing facilities by license condition unless they are directly related to on-site storage capacity, the ability of the facility to adequately throughput materials, or traffic pattern issues.

Table ME3 2006 C&D Waste Inputs at ME Processors	
State	**Origin of C&D waste (tons)**
Maine	130,429
Massachusetts	44,203
New Hampshire	9,288
New York	33
TOTAL	**183,953**

In Maine, approximately half of processed C&D waste is recovered, as shown in Table ME4. In 2006, the majority of C&D waste recovery occurred at C&D processing facilities, although some landfills did report recovery of metal and clean wood from the C&D wastes received. Unlike in some other states, most processing facilities in Maine are particular about the material they accept for processing and prefer to process "wood rich" materials. This limits the quantity that cannot be recovered, with 49.2 percent of the outgoing C&D material disposed or used as ADC in 2006 – a relatively high percentage when compared to other NEWMOA-member states. As shown in Tables ME 3 and ME4, more material came out of processors than went in: 238,625 tons out versus 183,953 tons in. Some C&D waste processors are allowed to store some quantities of material at their facility, and in 2006 might have distributed some of this material.

Table ME4 2006 C&D Waste Processor Outputs & Destinations			
Stat	**Recovered (tons)**	**Landfill Use (tons)**	**Disposed (tons)**
Maine	121,327	38,094	59,037
New Hampshire	0	0	7,070
Non-NEWMOA	0	0	13,097
TOTAL	**121,327**	**38,094**	**79,204**

As shown in Table ME5, of the 121,327 tons of material recovered from Maine processors in 2006, 94,678 tons, or 78 percent was C&D wood fuel chip. Maine has bio-mass boilers that burn wood for conversion to electricity. Bio-mass boilers are required to obtain a license from ME DEP's Bureau of Air Quality and a beneficial use determination from the Bureau of Waste Management in order to utilize C&D wood chip as fuel. C&D wood waste is limited by ME DEP rules to 50 percent or less of the fuel consumed by these boilers.

Table ME5 2006 C&D Waste Processors - Materials Recovered & Destination (tons)					
State	**Gypsum**	**Clean Wood**	**Fuel Chip**	**Metal**	**Asphalt Shingles**
Maine	4,052	64	94,678	1,877	20,656

In addition to the C&D wood fuel chip produced by processors in Maine, processors in Massachusetts, New Hampshire, and Rhode Island reported sending C&D wood fuel chip to Maine biomass boilers in 2006: 18,919 tons, 125,500 tons, and 21,650 tons, respectively. Combined with the Maine-produced C&D wood fuel chip, a total of 260,747 tons of C&D wood fuel chip were sent for use at bio-mass facilities in Maine in 2006. This is approximately 17 percent less than the 312,696 tons of C&D wood fuel chip that Maine bio-mass boilers reported receiving in 2002.

Markets for Recovered C&D Waste Materials

As discussed above, most recovered material in Maine was C&D wood fuel chip, along with asphalt shingles, metal and gypsum wall board. Table ME6 presents estimates of the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in Connecticut in 2006; and the difference.

Table ME6 Estimated 2006 C&D Waste Materials Generated & Recovered in Maine			
Material	**Generated in Maine (estimated tons)***	**Recovered in Maine (tons)**	**Difference (tons)**
Metals	25,776	1,877	23,899
Concrete and Rubble (ABC)	46,398	0	46,398
Drywall			
Construction (clean)	30,932	4,052	26,880
Demolition/Renovation (dirty)	20,621	0	20,621
Roofing	56,708	20,656	36,052
Wood:			
Unadulterated (e.g., construction scraps, pallets)	59,286	64	59,222
Adulterated (e.g., painted, engineered)	107,745	94,678	13,067

* Calculated based on the percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this Report) multiplied by the total quantity of C&D waste generated in Maine in 2006.

The results shown in Table ME6 indicate that there is potential to increase reuse/recycling of most marketable materials in Maine. Data on plastic recycling from C&D wastes was not available. Recovery of ABC is likely because it is considered an inert material and can be reused without entering a facility that reports data to ME DEP. A portion of the unadulterated, "clean" C&D wood may be recycled or composted at facilities that do not report it to ME DEP as C&D waste. When C&D waste processing data in the New Hampshire state-specific appendix to this Report is reviewed, some C&D waste generated in Maine is processed in New Hampshire, and high rates of wood waste were recovered by New Hampshire C&D waste processor for fuel chip in 2006. Therefore, it is likely that the total quantities of C&D wood waste generated in Maine and recovered are higher than in Table ME6.

Post consumer asphalt shingles have been collected by the large processing facility in southern Maine and utilized for parking lot and other pavements under a beneficial use determination issued by ME DEP since 1994. In 2006, 20,656 tons were recycled, or 36 percent of the estimated quantity generated in Maine. Since 2006, this southern Maine processor has focused on developing markets for a gypsum wallboard, particularly from demolition/renovation generation sources. The facility has a beneficial use determination from ME DEP to use both construction scrap and demolition gypsum wallboard material as a drying and handling agent in the processing of oil-contaminated soils for construction fill, mainly in sub-grade roadbase construction.

Data Caveats

There are significant C&D waste quantities and uses that are not captured in the information reported to ME DEP. Maine exempts the on-site disposal of C&D debris,[2] land-clearing debris and wood wastes from regulation and reporting when the following conditions are met:

- the solid waste boundary(ies) enclose(s) an area of less than one acre;
- the disposal area is located on the same parcel of land where the waste was generated; and
- there is only one exempt disposal facility on the parcel.

In addition, Maine exempts the disposal of inert fill, whether generated on-site or off-site. Inert fill is defined as clean soil material, rock, bricks, crushed clean glass or porcelain, and cured concrete. Inert fill can also be used as drainage material in construction projects or as raw material in cement, concrete, or asphalt production. Processed cured asphalt can also be used in paving material production, and road construction and maintenance, and these uses are exempt from additional licensing or reporting.

[2] The ME DEP definition of C&D debris includes but is not limited to: building materials, discarded furniture, asphalt, wall board, pipes and metal conduits. C&D debris excludes: partially filed containers of glues, tars, solvents, resins, paints, or caulking compounds; friable asbestos, and other special wastes.

Massachusetts

The Massachusetts Department of Environmental Protection (MassDEP) requires that all landfills, waste-to-energy (WTE) facilities and handling facilities, including transfer stations and C&D waste processing facilities, submit annual report forms to MassDEP that include the type, tons, and state-of-origin of all waste accepted. Transfer stations must also report the type, tons, and destination facility name, town, and state for all materials leaving the transfer station. Enforcement action is taken for non-reporting, and the response rate from facilities is high. All annual reports are checked by MassDEP for accuracy, including contacting other states.

According to data submitted to MassDEP, enhanced by review of reports from other NEWMOA-member states and processing facility sources, a total of 1,852,151 tons of C&D waste was generated in Massachusetts in 2006,[1] an increase of 65 percent from the 1,123,551 tons reported in 2002. According to the Federal Reserve Bank of Boston's Indicators Database,[2] in Massachusetts between 2002 and 2006 there was a 15 percent increase in the value of residential construction contracts, and a 21 percent decrease in the value of non-residential building construction contracts. Therefore, much of the increase in documented C&D waste generation could be attributable to better reporting by C&D waste management facilities to MassDEP, and increased scrutiny of the 2006 data by NEWMOA compared with the 2002 data.

C&D Waste Disposal

The C&D waste generated in Massachusetts that was disposed, either in-state or elsewhere, was 884,771 tons in 2006, or 47.8 percent of the total documented generation.[3] C&D waste disposal in 2006 is presented in Table MA1.

Table MA1
2006 C&D Waste Generated in MA & Disposed

State	Disposal (tons)
Connecticut	332
Maine	220,600
Massachusetts	290,388
New Hampshire	72,505
New York	21,833
Rhode Island	41,288
Non-NEWMOA States	279,113
TOTAL	**926,059**

[1] This estimate includes: 913,244 tons reported by Massachusetts processors (estimate subtracts 18,865 tons transferred between processors to avoid double-counting); 585,581 tons reported by Massachusetts transfer stations (estimate subtracts 148,947 tons of C&D waste sent from transfer stations to processors to avoid double-counting); 332 tons and 48,355* tons reported by Connecticut disposal facilities and processors, respectively; *45,647 tons and 43,348* tons reported by Maine disposal facilities and processors, respectively; 31,902* tons and 147,901* tons sent to New Hampshire disposal facilities and processors, respectively; 2,119* tons sent to New York disposal and processing facilities, respectively; and 14,000 tons reported by Rhode Island processors. * Note: these estimates were adjusted for exports reported by Massachusetts processors and transfer facilities to avoid double-counting.

[2] www.bos.frb.org/economic/neei/neeidata.htm#construction

[3] Another 584,371 tons of C&D waste was processed into alternative daily cover used at landfills. Therefore, 1,469,142 tons, or 79.3 percent of the C&D waste generated by Massachusetts in 2006 ended up in a landfill.

MassDEP records indicate that all of this waste first went to a processing facility or transfer station. In 2006, 290,388 tons of C&D waste was disposed in Massachusetts facilities, which was 32.8 percent of the total disposed. Another 314,938 tons, or 35.7 percent of C&D waste disposed was shipped to facilities located in other NEWMOA-member states, and 279,113 tons of C&D waste, or 31.5 percent was sent for disposal at facilities outside the Northeast region, primarily in Ohio.

As shown in Table MA2, most of the C&D waste that was disposed at facilities in Massachusetts was generated in Massachusetts with 25 percent, 97,115 tons from out-of-state, mainly from Connecticut.[4]

Table MA2
2006 Origin of C&D Waste Disposed in MA

State	**C&D Waste (tons)**
Connecticut	94,885
Massachusetts	290,388
New Hampshire	1,865
Rhode Island	17
Vermont	348
TOTAL	**387,503**

Comparison of 2002 & 2006 Waste Disposal Data

In 2002 the amount of C&D generated in Massachusetts that was disposed, either in Massachusetts or elsewhere, was 669,446 tons, or 59.6 percent of documented generation. In addition, 376,385 tons of C&D fines and residuals from Massachusetts' processing facilities were used as alternate daily cover (ADC) and grading material at landfills in Massachusetts, Maine, New Jersey, and Rhode Island, bringing the total ending up in a landfill environment in 2002 to 1,045,831 tons or 93.1 percent of generation. Although the absolute quantities increased between 2002 and 2006, there was a decrease in both the percentage of C&D waste generation that was disposed and that ended up in a landfill environment.

In 2002, Massachusetts facilities exported 250,518 tons of C&D waste for disposal in out-of state facilities, with 113,734 tons to facilities outside the NEWMOA region. In 2002, of the NEWMOA states that received C&D waste from Massachusetts, New York received roughly 60,000 tons, and Maine roughly 40,000 tons, and New Hampshire less than 8,000 tons. By 2006 this had changed significantly with Maine receiving 220,600 tons, a 550 percent increase; New Hampshire 72,505 tons, a 900 percent increase; and New York 21,833 tons, a 64 percent decrease.

In 2002, Massachusetts facilities accepted 150,559 tons of C&D waste from other NEWMOA states for disposal, primarily from Connecticut. Between 2002 and 2006 the quantity of C&D

[4] Massachusetts disposal facilities only reported receiving 3,242 tons of C&D waste from Connecticut sources. Data supplied by CT DEP was used as agreed by MassDEP because, the disposal facility might have reported the C&D waste to MassDEP as MSW and/or as generated in Massachusetts.

from out-of-state disposed at Massachusetts' facilities diminished by approximately 35 percent to a total of 97,115 tons, again primarily from Connecticut.

C&D Waste Processing

According to MassDEP records, all C&D waste generated is handled at a processor, a transfer station, or both. In 2006, there were 11 C&D waste processing facilities in Massachusetts that received a total of 932,109 tons of C&D wastes, of which 18,865 tons was transferred from another processor (and is removed from total figures to avoid double-counting). An additional 734,528 tons of C&D waste was received at Massachusetts transfer stations, of which 148,947 was transferred to a Massachusetts C&D waste processing facility and is included in the 932,109 tons processing total.[5] The total permitted capacity of the 11 C&D waste processing facilities was 7,705 tons per day (tpd) or 2,003,300 tons per year[6] in 2006, with individual facility permits ranging from 450 tpd to 1,000 tpd. Most of the C&D waste received at Massachusetts processors is generated in Massachusetts with only 12,646 tons coming from out of state, as shown in Table MA3.

Table MA3
2006 Origin of C&D Waste Inputs at MA Processors

State	Quantity (tons)
Connecticut	12,552
Massachusetts	913,244
Vermont	94
TOTAL	**925,890**

Table MA4 shows the outputs of Massachusetts C&D processors and the states that received the materials in terms of disposal, landfill uses (such as ADC), and recovered. Of the 913,244 tons of C&D waste handled once at Massachusetts processors, 79,537 tons, or 8.7 percent was recovered for reuse/recycling.

Table MA4
2006 C&D Waste Processor Outputs & Destinations

State	Recovered (tons)	Landfill Use (tons)	Disposed (tons)
Connecticut	4,683	0	386
Maine	19,509	0	105,119
Massachusetts	50,236	584,371	158,402
New Hampshire	481	0	29,856
New York	0	0	8,100
Rhode Island	4,628	0	32,361
TOTAL	**79,537**	**58,4371**	**334,224**

Table MA5 presents the materials recovered for reuse/recycling. The material recovered in the greatest quantity in 2006 was metal, followed by ABC aggregates and wood fuel chip. Most of

[5] The 148,947 tons is removed from total C&D generation estimates to avoid double-counting
[6] Assumes the facilities operate 5 days a week, 52 weeks a year

the recovered metal and ABC went to companies located in Massachusetts, whereas C&D wood fuel chip was transferred to Maine.

Table MA5
2006 C&D Waste Processors - Material Recovered & Destinations

State	Gypsum (tons)	Clean Wood (tons)	Fuel Chip (tons)	Metal (tons)	Aggregate (tons)
Connecticut	0	0	0	4,683	0
Maine	0	0	18,919	0	590
Massachusetts	598	2,031	0	26,810	21,263
New Hampshire	0	0	0	15	0
New York	0	0	0	0	0
Rhode Island	0	0	1,850	2,778	0
TOTAL	**598**	**2,031**	**20,769**	**34,286**	**21,853**

Comparison of 2002 & 2006 Processing Data

According to MassDEP records, the total amount of C&D waste that was received at Massachusetts processing facilities and transfer stations in 2002 was 1,134,074 tons, which increased by 33 percent in 2006 to 1,511,471 tons. However, the 2002 data likely included the double-counting that was removed from the 2006 data and therefore, the percent increase was probably even greater. The amount of material handled by Massachusetts transfer and processing facilities in 2002 that came from out-of-state was 84,685 tons, 670 percent more than the 12,646 tons handled from out-of-state sources in 2006. These estimates include data from both transfer stations and processing facilities, while the following sections only present data from processing facilities.

In 2002, Massachusetts processing facilities recovered a total of 74,507 tons of C&D waste that was marketed and did not end up in the landfill environment, very close to the 79,537 tons recovered in 2006. In 2002, the types and quantities of materials recovered were similar to those in 2006: C&D wood fuel chips - 31,444 tons in 2002 and 22,800 tons in 2006; metal – 25,024 tons in 2002 and 34,286 tons in 2006; and ABC aggregates - 17,990 tons in 2002 and 21,853 tons in 2006.

The amount of C&D waste sent from Massachusetts processing facilities to disposal facilities in 2002 was 536,497 tons, which increased by 65 percent to 884,771 tons in 2006. In addition to the amount sent for disposal, 376,385 tons of C&D fines from Massachusetts' processing facilities were used as alternate daily cover (ADC) and grading material at landfills in 2002, increasing by 55 percent to 584,371 tons in 2006. In total, 912,882 tons of C&D material from processors ended up in a landfill in 2002, which increased by 61 percent to 1,469,142 tons in 2006. In conclusion, virtually all of the increase in C&D material handled in Massachusetts between 2002 and 2006 ended up in the landfill environment. The increase in the quantity of C&D material recovered for reuse/recycling in 2006 compared to 2002 was 5,000 tons.

Markets for Recovered C&D Waste Materials

As discussed above, recovered material in Massachusetts included mainly metal, ABC, and wood. Table MA6 presents estimates of the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in Massachusetts in 2006; and the difference.

Table MA6
Estimated 2006 C&D Waste Materials Generated & Recovered in Massachusetts

Material	Generated in Massachusetts (estimated tons)*	Recovered in Massachusetts (tons)	Difference (tons)
Plastics	37,043	NA	NA
Metals	92,608	34,286	58,322
Concrete and Rubble (ABC)	166,694	21,853	144,841
Drywall			
Construction (clean)	111,129	598	110,531
Demolition/Renovation (dirty)	74,086	0	74,086
Roofing	203,737	0	203,737
Wood:			
Unadulterated (e.g., construction scraps, pallets)	212,997	2,031	210,966
Adulterated (e.g., painted, engineered)	387,100	20,769	366,331

* Calculated based on the percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this Report) multiplied by the total quantity of C&D waste generated in Massachusetts in 2006.

The results shown in Table MA6 indicate that, in 2006 there was potential to increase reuse/recycling of most marketable C&D materials in Massachusetts. Data on plastic recycling from C&D wastes was not available. Some additional recovery of ABC beyond what is shown in Table MA6 is likely because it is considered an inert material and can be used without entering a facility that reports data to MassDEP. A portion of the unadulterated, "clean" C&D wood may be recycled or composted at facilities that do not report it to MassDEP as C&D waste. When C&D waste processing data in the New Hampshire state-specific appendix to this Report is reviewed, some C&D waste generated in Massachusetts is processed in New Hampshire, and high rates of wood waste were recovered by New Hampshire C&D waste processors for fuel chip in 2006. Therefore, it is likely that the total quantities of C&D wood waste generated in Massachusetts and recovered are higher than in Table MA6.

At the end of 2006, a facility that recycles gypsum wallboard opened in Cambridge, Massachusetts. The facility processes "clean" wallboard from construction projects and has developed relationships with processors throughout Massachusetts to obtain input material. The gypsum powder collected is provided to a wallboard manufacturer in New Hampshire. While some wallboard is being collected and recycled, the processor reports that the quantity is much lower than generated quantities and they are working toward narrowing this gap. The facility is working with MassDEP to obtain approval to process "dirty" wallboard, and with facilities that have the potential to use the resulting gypsum.

During 2006, two asphalt shingle recycling businesses began operation in Massachusetts to supply hot-mix asphalt to use on parking lots and in other non-road applications. As with wallboard, these facilities report that they could process much more material than they do and that finding outlets for their product is challenging.

Data Caveats

C&D waste material processors that are conditionally exempt recycling operations are not required to report to MassDEP. Exempt recycling facilities are those that recover materials for reuse, use as a feedstock to make a marketable product, or used as an effective substitute for a commercial product or commodity, and meet other general requirements. MassDEP performs an annual survey of the exempt facilities to obtain as much data as possible. However, the vast majority of these exempt facilities process ABC from road and bridge projects exclusively and are the type of facility that is not covered in this Report. Data from these exempt facilities was not included in this Report.

New Hampshire

All solid waste facilities in New Hampshire, including collection and storage facilities, are required to submit an Annual Facility Report to the New Hampshire Department of Environmental Services (NH DES). The report details waste generation, the markets and tonnages for recycling, level of composting, the tonnages of imports and the amounts and destination of exports. Disposal facilities are also required to submit quarterly tonnage reports, which allows for timely estimates of imports and capacity.

According to data submitted to NH DES, enhanced by review of reports from other NEWMOA-member states and processing facility sources, a total of 442,301 tons of C&D waste was generated in New Hampshire in 2006,[1] an increase of 55 percent from the 243,470 tons reported in 2002. However, according to the Federal Reserve Bank of Boston's Indicators Database,[2] in New Hampshire between 2002 and 2006 there was a 29 percent increase in the value of residential construction contracts, but also a 13 percent decrease in the value of non-residential building construction contracts. Therefore, a portion of the increase might be attributable to residential construction increases, and a portion to better reporting by C&D waste management facilities to NH DES, and increased scrutiny of the 2006 data by NEWMOA compared to the 2002 data.

C&D Waste Disposal

The amount of C&D waste generated in New Hampshire that was disposed in New Hampshire and elsewhere was 326,105 tons in 2006, or 73.7 percent of the total generated. Of this, 206,221 tons, or 63.2 percent was disposed directly in landfills without first passing through a processing facility. As shown in Table NH1, most of the New Hampshire generated C&D waste that is disposed is done so at in-state landfills, 88.4 percent, with some going to Maine and a fraction to Massachusetts.

Table NH1
2006 C&D Waste Generated in NH & Disposed

State	Disposal (tons)
Maine	36,076
Massachusetts	1,865
New Hampshire	277,417
TOTAL	**315,358**

Table NH2 shows the origin of the 360,805 tons of C&D waste disposed at New Hampshire facilities – 80 percent was in-state generated and 20 percent exported from Massachusetts.

[1] The 2006 generation total results from 206,221 tons directly disposed in New Hampshire landfills, 36,076 tons received for disposal as reported by Maine landfills, 1,865 tons received for disposal as reported by Massachusetts landfills, 187,111 tons received at New Hampshire processors, 9,288 tons reported received at Maine processors, 876 tons reported received by Massachusetts transfer stations, and 864 tons received at a Vermont landfill for processing.

[2] www.bos.frb.org/economic/neei/neeidata.htm#construction

Table NH2 2006 Origin of C&D Waste Disposed in NH	
State	**C&D Waste (tons)**
Massachusetts	72,505
New Hampshire	277,417
Vermont	5,412
TOTAL	**355,334**

Comparison of 2002 & 2006 Disposal Data

In 2002, the amount of C&D waste generated in New Hampshire and disposed was 120,866 tons, with 114,177 tons disposed in-state and 6,689 tons to Massachusetts. By 2006, disposal of New Hampshire generated C&D waste increased 270 percent, and Maine had become the destination of the majority of the 37,941 tons sent out-of-state. New Hampshire facilities imported 36,141 tons of C&D waste in 2002, 6,244 tons from Vermont, 7,886 tons from Massachusetts, and 22,011 tons from Maine. By 2006, the import of C&D waste for disposal doubled with virtually all arriving from Massachusetts.

C&D Waste Processing

In 2006, there were two facilities that handled the majority of C&D waste processing in New Hampshire and reported receiving 381,111 tons of material, 49 percent generated in New Hampshire and 51 percent generated out-of-state, primarily Massachusetts. Table NH3 presents the origin of C&D waste processed at New Hampshire facilities and Table NH4 illustrates the outputs. NH DES does not require detailed reporting on processor output materials, quantities, or destinations. Output information was obtained directly from the processing facilities and is estimated.

Table NH3 2006 C&D Waste Inputs at NH Processors	
State	**Quantity (tons)**
Maine	13,454
Massachusetts	180,546
New Hampshire	187,111
TOTAL	**381,111**

Table NH4 2006 C&D Waste Processor Outputs & Destinations			
State	**Recovered (tons)**	**Landfill Use (tons)**	**Disposed (tons)**
Maine	125,500	36,555	0
Massachusetts	5,016	62,925	0
New Hampshire	19,213	26,370	71,196
TOTAL	**159,904**	**125,850**	**71,196**

In 2006, 71,196 tons was disposed in New Hampshire, and 125,850 tons was used as ADC resulting in 51.7 percent of C&D waste processed by New Hampshire facilities in 2006 ending

up in a landfill, and 48.3 percent recovered for reuse/recycling, a higher rate than achieved by processors in most states. Unlike in some other states, processing facilities in New Hampshire are particular about the material they accept for processing. This limits the quantity that New Hampshire processors can recover. However, because New Hampshire processors have policies that prefer a higher quality of incoming material, it results in a relatively greater quantity of C&D waste sent directly for disposal when compared to other NEWMOA states. For example, as discussed earlier approximately 206,221 tons, or 63.2 percent of total New Hampshire C&D waste generation in 2006 was disposed directly in landfills without first passing through a processing facility; whereas in Connecticut and Massachusetts virtually all C&D waste generated is sent to a C&D waste processor.

Table NH5 shows the materials recovered by New Hampshire C&D processors and where they went. Almost 84 percent of all recovered material in 2006 was C&D wood fuel chip that went to Maine. The other recovered materials in 2006 were metal and ABC aggregates.

Table NH5
2006 C&D Waste Processors - Material Recovered & Destinations

State	Fuel Chip (tons)	Metal (tons)	Aggregate (tons)
Maine	125,500	0	0
Massachusetts	0	0	5,016
New Hampshire	0	19,204	10,184
TOTAL	**125,500**	**19,204**	**15,200**

Comparison of 2002 & 2006 Processing Data

According to NH DES records, New Hampshire processing facilities handled 295,630 tons of C&D waste in 2002, with 41.4 percent (122,612 tons) of the wasted processed in 2002 originating in New Hampshire and 58.6 percent (173,378 tons) imported, primarily from Massachusetts. The quantity processed by New Hampshire facilities increased 29 percent in 2006. In the 2002 data report, NEWMOA did not contact C&D waste processors directly and therefore, the types of materials recovered by New Hampshire processors and their respective quantities and destinations are not documented for 2002.

Markets for Recovered C&D Waste Materials

As discussed above, wood was the C&D material recovered in the greatest quantity by New Hampshire processors in 2006. Table NH6 estimates the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in New Hampshire in 2006; and the difference.

Table NH6 Estimated 2006 C&D Waste Materials Generated & Recovered in New Hampshire			
Material	**Generated in New Hampshire (estimated tons*)**	**Recovered in New Hampshire (tons)**	**Difference (tons)**
Plastics	8,846	NA	8,846
Metals	22,115	19,204	2,911
Concrete and Rubble (ABC)	39,807	15,200	24,607
Drywall			
Construction (clean)	26,538	0	26,538
Demolition/Renovation (dirty)	17,692	0	17,692
Roofing	48,653	0	48,653
Wood			
Unadulterated (e.g., construction scraps, pallets)	50,865	0	50,865
Adulterated (e.g., painted, engineered)	92,441	125,500	-33,059

* Calculated based on the percent by weight as reported in the DSM Environmental report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this report) multiplied by the total quantity of C&D waste generated in New Hampshire in 2006.

The data presented in Table NH6 shows that most of the metal that would be expected to be generated from C&D waste projects is currently recycled in New Hampshire. The data showing that more C&D wood is recycled than was generated reflects the fact that only half of the C&D processed by New Hampshire facilities is generated in New Hampshire. Therefore, a portion of the wood waste recovered in New Hampshire was generated in states that send C&D to New Hampshire processors (Massachusetts and Maine). The available information indicates that wood waste generated in Massachusetts and Maine is recovered in greater quantities than using recovery data only from Massachusetts or Maine processors, respectively.

From the information contained in Table NH6, there is potential to increase reuse/recycling of other marketable materials in New Hampshire. Of the materials listed, plastic from C&D projects is not segregated out from general recycling data, and therefore it is likely that some recycling of C&D plastic is already occurring. The same is probably true for more of the ABC, which is considered an inert material and can be used without entering a facility that reports data to NH DES. Lastly, at least a portion of the unadulterated, "clean" wood may be recycled or composted at facilities that do not report it as C&D waste – however, some of the C&D wood included in the adulterated, "dirty" wood data may be clean wood, reducing the quantity of adulterated wood recovered. This leaves drywall, roofing, and both clean and dirty wood for future focus in New Hampshire.

Data Caveats

There might be significant C&D waste quantities and uses that are not captured in the information reported to NHDES. Brick, concrete, masonry, bricks and asphalt are exempt from regulation. C&D waste materials that go to direct re-use in kind would not be reported. Also, source separated materials that become components of certified waste-derived products by rule

may not be reported. An example of a certified waste-derived product by rule is source-separated asphalt shingles going into a comparable asphalt product.

New Jersey

The New Jersey Department of Environmental Protection (NJ DEP) maintains a comprehensive tonnage reporting system for solid waste disposal and recycling activity; however, it is not possible to determine the actual amount of construction and demolition waste that was generated in 2006. This is due to several reasons. Construction and demolition waste that is disposed is sometimes misclassified by the disposal facility in their reporting to NJ DEP as bulky waste rather than as C&D waste. In addition, disposal facilities that are permitted to cull recyclables from incoming waste, known as materials recovery facilities do not distinguish in their record-keeping systems how the material received was generated. Furthermore, recycling centers for components of the construction and demolition waste stream are required to keep records of the amount of material received by municipality of origin, they are not required to specify whether the material was generated by a construction or demolition project as opposed to a road/bridge project or a land clearing project.

C&D Waste Disposal

According to the NJ DEP's data reporting system, 948,892 tons of C&D waste generated in New Jersey was disposed in 2006. Of this amount, 53 percent, 503,217 tons was disposed in New Jersey, and 47 percent, 445,675 tons was disposed out-of-state. According to NJ DEP, construction and demolition waste (classified in New Jersey's solid waste rules as "Type 13C") often gets incorrectly reported as Bulky Waste (classified in New Jersey's solid waste rules as "Type 13") at the disposal facility. Therefore, it is likely that a significant percentage of the tonnage of Bulky Waste reported as disposed in 2006 was actually C&D waste. In 2006, 857,933 tons of bulky waste was generated in New Jersey and disposed. Of this amount, 82 percent, 701,415 tons was disposed in New Jersey, and 18 percent, 156,518 tons was disposed out-of-state. Most out-of-state disposal occurred at facilities outside the NEWMOA-member region.

C&D Processing/Class B Recyclable Materials

Pursuant to New Jersey's solid waste rules (N.J.A.C 7:26), mixed C&D debris is classified as solid waste and must be sent to a permitted solid waste disposal facility. Materials recovery facilities (MRFs) are considered disposal facilities in New Jersey and can receive mixed waste that is then culled for recyclables. The majority of the incoming waste received at a MRF remains as solid waste in need of shipment and disposal, while a smaller percentage of the incoming material is separated for recycling. There are over 30 MRFs in New Jersey that can process C&D debris along with other solid wastes. Pursuant to New Jersey's recycling rules (N.J.A.C. 7:26A), source separated components of the construction and demolition waste stream, such as asphalt, concrete, brick and wood, are classified as "Class B recyclable materials" and may be delivered to any recycling center in New Jersey approved by the NJ DEP to accept Class B recyclables. There are over 100 approved Class B recycling centers in New Jersey that can accept source separated components of the solid waste stream, including components of C&D waste.

As discussed above, both MRFs and Class B Recycling centers do not distinguish the source of the waste materials they receive. Therefore, it is not possible to determine the quantity of non-road C&D project waste handled by either type of facility, or the percentage of each outgoing recycled material that was from a non-road C&D project.

Markets for Recovered C&D Waste Materials

Components of C&D waste have several markets in New Jersey. There are many recycling centers in New Jersey for the scrap metal and corrugated cardboard generated by construction and demolition activities. Concrete, concrete block, asphalt, and brick are typically crushed and used as a substitute for quarry stone in road construction projects. In addition, this material is used as a fill material in various applications. Crushed brick is also used as a decorative landscaping material. Asphalt can be processed such that it can be reincorporated into the hot mix asphalt for ultimate use in road paving projects. Non-chemically treated and non-painted wood scrap, as well as tree stumps and tree trunks, are shredded, stored and aged in outdoor piles and then sold as landscaping mulch.

At this time, there are no recycling centers in New Jersey actively receiving and processing asphalt-based roofing scrap, including asphalt shingles, or gypsum wallboard for recycling purposes. There are two facilities in Pennsylvania that will soon be permitted to receive and recycle gypsum wallboard. Some of the source separated gypsum wallboard generated in New Jersey may be shipped to these facilities for recycling once they are approved.

New York

All solid waste landfills, municipal waste combustors, transfer stations and C&D waste processors are required to submit annual reports to the New York State Department of Environmental Conservation (NYS DEC). Data required includes: the quantity of waste received, the service area, the destination of the solid waste, materials recovered, and any beneficial use of waste (i.e., ADC, roads on the landfill).

According to data supplied to NYS DEC, enhanced by review of reports from other NEWMOA-member states and processing facility sources, a total of 5,530,655 tons of C&D waste was generated in New York in 2006.[1] This is an increase of 82 percent from the 3,032,000 tons reported in 2002. This is a greater percentage increase than in other NEWMOA-member states and is likely due to a focused effort by NYS DEC since 2002 to improve the completeness and quality of the reporting by C&D waste management facilities to NYS DEC.

C&D Waste Disposal

C&D waste disposal in 2006 is presented in Table NY1. The amount of reported C&D waste generated by New York facilities that was disposed, either in-state or elsewhere, was 3,407,817 tons in 2006 or 61.6 percent of the total documented generation. In 2006, 2,108,740 tons of the C&D waste generated in New York was disposed in New York facilities or 61.9 percent of the total disposed. Another 1,270,423 tons or 37.3 percent of C&D waste disposed went to facilities located in states outside the NEWMOA region (i.e., Pennsylvania, Ohio, and Virginia), and just 28,690 tons of C&D waste or 0.8 percent was sent for disposal at facilities in NEWMOA-member states, primarily New Jersey.

Table NY1
2006 C&D Waste Generated in NY & Disposed

State	Disposal (tons)
Maine	197
New Jersey	25,280
New York	2,108,740
Vermont	3,213
Non-NEWMOA States	1,270,423
TOTAL:	**3,407,817**

As shown in Table NY2, most of the C&D waste disposed in New York originated in New York with only 235,022 tons of C&D waste received for disposal from out-of-state in 2006. Most was sent from Connecticut facilities, followed by non-NEWMOA states and provinces, and then smaller quantities from Massachusetts, New Jersey, and Vermont.

[1] 1,130,365 tons direct to NYS landfill disposal; 4,209,987 tons input at NY C&D waste processors and 8,666 tons and 33 tons reported input at CT and ME C&D waste processors, respectively; 151,797 tons sent from NYS transfer stations to facilities in non-NEWMOA states, and 29,807 tons sent to facilities in New Jersey.

Table NY2 2006 Origin of C&D Waste Disposed in NY	
State	**C&D Waste (tons)**
Connecticut	107,393
Massachusetts	21,833
New Jersey	12,707
New York	2,108,740
Rhode Island	5
Vermont	2,625
Non-NEWMOA	90,459
TOTAL	**2,343,726**

Comparison of 2002 & 2006 Disposal Data

Table NY3 presents a comparison of disposal data from 2002 and 2006.

Table NY3 Comparison of 2006 & 2002 C&D Waste Disposal Data		
	2002	**2006**
Generated in NY & Disposed	2,799,500	3,407,817
In New York	1,747,218	2,108,740
In NEWMOA states	39,282	28,690
In non-NEWMOA states	1,013,00	1,270,423
Disposed in New York	1,838,000	2,343,726
Generated in NY	1,740,094	2,108,740
Generated in NEWMOA states	90,906	144,563
Generated in non-NEWMOA states	0	90,459

The overall quantity of C&D waste generated in New York and disposed increased by 21.7 percent from 2002 to 2006. Disposal in non-NEWMOA member states increased slightly from 2002 to 2006 and decreased slightly to NEWMOA-member states. Of the C&D waste imported from NEWMOA-member states in 2002, 60,012 tons were from Massachusetts, 22,419 tons from Connecticut, 5,475 tons from Vermont. By 2006, the overall quantity imported increased by 59 percent, and relative contributions changed as well, with most arriving from Connecticut. In 2002 there were no imports from non-NEWMOA states and provinces reported.

C&D Waste Processing

In 2006, there were 71 regulated and 236 registered C&D Debris Processing Facilities in New York that accepted source segregated and/or mixed C&D wastes. Combined, the facilities that received some mixed C&D wastes reported accepting a total of 4,295,522 tons of C&D wastes (mixed and source segregated), of which 4,209,987 tons, or 98 percent was generated in New York, and 85,535 tons came from out-of-state, as illustrated in Table NY4.

Table NY4 2006 Origin of C&D Waste Inputs at NY Processors	
State	**Quantity (tons)**
Connecticut	1,124
Massachusetts	8
New Jersey	70,432
New York	4,209,987
Vermont	13,823
Non-NEWMOA states	148
TOTAL	**4,295,522**

Table NY5 presents the outputs of New York C&D waste processors and the states they sent C&D waste to for disposal, landfill uses (such as ADC), and recovery.

Table NY5 2006 C&D Waste Processor Outputs & Destinations (tons)			
State:	**Recovered (tons)**	**Landfill Use (tons)**	**Disposed (tons)**
New Jersey	343,518	0	25,264
New York	980,740	618,636	978,339
Vermont	0	3,868	3,213
Non-NEWMOA	128,413	0	1,118,626
TOTAL	**1,452,671**	**622,504**	**2,125,442**

Of the 4,295,522 tons of C&D waste handled at New York processors, 1,452,671 tons, or 33.8 percent was recovered for reuse/recycling. As shown in Table NY5, 2,125,442 tons was disposed or used at landfills. The combined reported output quantities for recovery and disposal/landfill uses totals 4,200,617 tons, which is 94,905 tons less than the reported processor inputs of 4,295,522 tons as shown in Table NY4. 94,905 tons is 2.2 percent of the total reported inputs, and therefore, the fate of 97.8 percent of the C&D waste processed is accounted for.

Figure NY6 provides more detail on the materials recovered for reuse/recycling from processing facilities in New York in 2006.

Table NY6 2006 C&D Waste Processor – Material Recovered & Destination						
State:	**Gypsum (tons)**	**Clean Wood (tons)**	**Fuel Chip (tons)**	**Metal (tons)**	**Aggregate (tons)**	**Other* (tons)**
New Jersey	0	8,437	91,380	7,609	230,425	5,667
New York	35,085	150,086	34,441	203,549	398,838	160,740
Non-NEWMOA	0	1,575	11,934	0	8,213	106,691
TOTAL	**35,085**	**160,098**	**137,755**	**211,158**	**637,476**	**273,098**

*Other includes: plastic, paper, cardboard, rock and soil.

The material recovered in the greatest quantity in 2006 was ABC aggregates, followed by metal, clean wood, and wood fuel chip. Many of the C&D waste processing facilities in New York are located near major cities and process roadwork projects as well as C&D waste generated from building-related projects. Therefore, ABC from road projects is likely included in the quantity of aggregate recovered, increasing it significantly above the quantity that would be recovered from building-related C&D waste.

Much of the C&D material recovered in New York stayed in New York in 2006. For example, 96 percent of the metal, and 94 percent of the clean wood recovered by New York processors went to companies located in New York. 63 percent of the ABC aggregates were transferred within New York, and 36 percent of the ABC aggregates went to companies in New Jersey. Most of the wood fuel chips were sent out-of state: 66 percent were transferred to New Jersey and 9 percent to Pennsylvania.

Comparison of 2002 & 2006 Processing Data

According to NYS DEC records, the amount of C&D waste processed in New York in 2002 was 2,542,000 tons. The quantity processed in 2006 increased by 69 percent to 4,295,522 tons. In 2002, the composition of this material was unknown, as was the origin. However, in 2002 no NEWMOA states reported sending C&D waste to New York for processing. In 2002, most of the waste handled was mixed C&D waste and was reported to NYS DEC as landfilled or used beneficially at the landfill as ADC or in roads within the landfill's containment system. None of the processed waste was reported to NYS DEC as being marketed in 2002. In 2006, almost 34 percent of the material processed was recovered for reuse or recycling.

Markets for Recovered C&D Waste Materials

As discussed above, the main recovered C&D materials in New York in 2006 were aggregates, metal, clean wood, and wood fuel chip. Table NY7 presents estimates of the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in New York in 2006; and the difference.

There are two observations that stand out from the data in Table NY7. First a significant percentage of the metal available from C&D waste is already recycled by New York processing facilities. Second, the high quantity of ABC recycled by New York facilities, 28 percent higher than would be expected to be available, indicates that ABC from road and bridge projects was likely included in the data reported by the processing facilities in 2006. NEWMOA contacted several of the facilities that process large tonnages of material, but they were unable to specify the sources of their incoming material.

From the information contained in Table NY7, there is potential to increase reuse/recycling of most marketable C&D waste materials in New York, particularly drywall, roofing, clean wood, and adulterated wood. At least a portion of the unadulterated, "clean" wood is probably recycled or composted at facilities that do not report it as C&D waste.

Table NY7 Estimated 2006 C&D Waste Materials Generated & Recovered in New York			
Material	**Generated in New York (estimated tons*)**	**Recovered in New York (tons)**	**Difference (tons)**
Plastics	110,613	5,558	105,055
Metals	276,533	211,158	65,375
Concrete and Rubble (ABC)	497,759	637,476	-139,717
Drywall			
Construction (clean)	331,839	35,085	296,754
Demolition/Renovation (dirty)	221,226	0	221,226
Roofing	608,372	0	608,372
Wood:			
Unadulterated (e.g., construction scraps, pallets)	636,025	160,098	475,927
Adulterated (e.g., painted, engineered)	1,155,907	137,755	1,018,152

* Calculated based on the percent by weight as reported in the DSM Environmental report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this report) multiplied by the total quantity of C&D waste generated in New York in 2006.

Data Caveats

Data that may not be captured by reports submitted to NYS DEC may include inert material (i.e., concrete, asphalt, brick and other masonry materials, soil, glass, and rock) that is disposed in an exempt manner. To be exempt, the material must be recognizable (large chunks - not fines) and must be disposed during the daylight hours and no fee can be charged, or any other form of financial consideration provided. Practically, when no fee can be charged the inert material is probably buried or used as fill at the job site. There are also exemptions for NYS Department of Transportation and NYS Thruway Authority facilities.

Rhode Island

The Rhode Island Department of Environmental Management (RI DEM) requires all licensed and registered solid waste management facilities, including landfills, transfer stations, C&D waste processing facilities, and composting facilities, to submit an Annual Solid Waste Survey. The Survey details the tonnages of solid waste, construction and demolition waste, recyclables, and leaf and yard waste received, stored, and removed by facilities and the tonnages of waste landfilled within Rhode Island. In addition, facilities are required to provide the amount of waste exported to other states and the destination location of those exports.

According to annual report data submitted to RI DEM by Licensed Solid Waste Facilities, enhanced by a review of other NEWMOA-member states' data, Rhode Island generated a total of 202,161 tons of C&D waste in 2006,[1] 32 percent more than the 153,172 tons reported in 2002. This is the lowest percent increase recorded by a NEWMOA-member state. The per capita C&D waste generation rate in 2006 of 0.19 tons per person for Rhode Island is also much lower than recorded by other states with complete data, which range from 0.24 for Vermont to 0.42 for Connecticut. These factors combine to indicate that some C&D waste generated in Rhode Island is managed at facilities that do not report to RI DEM.

C&D Waste Disposal

According to data provided by RI DEM, supplemented by a review of data provided by other NEWMOA-member states, the amount of C&D waste generated by Rhode Island that was disposed as solid waste at landfills, was 10,676 tons in 2006, with most staying in Rhode Island, 800 tons sent to Ohio, and a total of 84 tons sent to other NEWMOA-member states, as presented in Table RI1. As discussed below in the C&D Waste Processing section, 176,159 tons of processed C&D waste was used for landfill cover material 2006, including 28,810 tons whose state of origin is unknown.[2] Therefore, it is likely that 158,025 tons of C&D waste generated in Rhode Island ended up in the landfill environment, 78.2 percent of the total documented quantity generated in Rhode Island.

Table RI1
2006 C&D Waste Generated in RI & Disposed

State	Disposal (tons)
Maine	62
Massachusetts	17
New York	5
Rhode Island	9,729
Non-NEWMOA States	800
TOTAL	**10,676**

[1] RI facility reports to RI DEM regarding in-state C&D waste: 190,163 tons reported received by C&D waste processors and 11,565 tons reported received by transfer stations, plus 433 tons reported received from RI sources by Massachusetts facilities reporting to MA DEP. The RI Resource Recovery Corporation (RIRRC) Central Landfill reported using 28,810 tons of C&D fines of unknown origin is not included as RI generated waste.
[2] As the origin is unknown, it is not assumed to be generated from RI sources.

According to RI state law, the Central Landfill is not allowed to import waste from other states for disposal. However, in 2006 facilities in Connecticut and Massachusetts reported sending 1,797 and 41,288 tons, respectively to Rhode Island for disposal as shown in Table RI2.

Table RI2
2006 Origin of C&D Waste Disposed in RI

State	C&D Waste (tons)
Connecticut	1,797
Massachusetts	41,288
Rhode Island	9,729
TOTAL	**52,814**

Of the material sent to Rhode Island for disposal from Massachusetts facilities in 2006, 29,135 tons was reported to MassDEP by various processing facilities as C&D waste sent for disposal to Patriot Hauling in Johnston, Rhode Island. Patriot Hauling does not have a RI DEM C&D waste Facility License and did not report waste processing activities to RI DEM. An additional 2,393 tons was reported by Massachusetts processors as sent to Patriot Hauling as C&D fines for disposal. Lastly, 7,836 tons was sent to Patriot Hauling from various Massachusetts transfer stations and reported to MassDEP as C&D waste sent for disposal. Connecticut and Massachusetts facilities reported that 1,797 tons and 1,378 tons, respectively, of C&D waste was sent to transfer facilities in Rhode Island that subsequently reported that their C&D waste was disposed in-state in 2006.

Comparison of 2002 & 2006 Disposal Data

The quantity of Rhode Island generated C&D waste disposed as solid waste in 2002 was 90,489 tons, with 76,948 tons at disposal facilities in Rhode Island, 33 tons in Massachusetts, and 13,508 tons sent out of the NEWMOA region. This compares to 10,676 tons reported disposed in 2006, a substantial decrease. In 2002, Massachusetts facilities reported sending 28,357 tons of C&D waste to Rhodes Island for disposal, and 26,429 for use as ADC, and Connecticut facilities reported sending 2,509 tons to Rhode Island for a total of 57,295 tons. In 2006, the quantity reported sent to Rhode Island for disposal by Connecticut and Massachusetts facilities decreased 25 percent to 43,085 tons.

C&D Waste Processing

In 2006, there were two private processing facilities in Rhode Island and one located at the RI Resource Recovery Corporation (RIRRC) that handled significant quantities of C&D wastes. Combined the three facilities reported receiving 190,163 tons of C&D waste from Rhode Island sources and 20,000 tons from Massachusetts in 2006, for a total of 210,163 tons of reported input as shown in Table RI3.

Table RI3
2006 Origin of C&D Waste Inputs at RI Processors

State	Quantity of C&D (tons)
Massachusetts	20,000
Rhode Island	190,163
TOTAL	**210,163**

The Rhode Island Resource Recovery Corporation (RIRRC) C&D waste facility reports an input of 130,845 tons of C&D wastes. However, information reported to RI DEM by the Central Landfill indicates that 52,566 tons of C&D screenings and 123,593 tons of Recovermat were used as landfill cover material in 2006. Recovermat is a patented product that is basically ground C&D waste. Therefore, the landfill used 176,159 tons of processed C&D for cover material in 2006. The three C&D waste processing facilities reported 10,592 tons disposed as solid waste and 52,868 tons of material recycled in 2006. Available C&D waste processing facility output data is summarized in Table RI4.

Table RI4
2006 C&D Waste Processor Outputs & Destinations

State	Recovered (tons)	Landfill Use (tons)	Disposed (tons)
Maine	21,650	0	0
Rhode Island	31,218	176,159	9,792
Non-NEWMOA	0	0	800
TOTAL	**52,868**	**176,159**	**10,592**

Combining the 176,159 tons of C&D waste used in the landfill environment with the 10,592 tons disposed, and the 52,868 tons recovered equals 239,619 tons of C&D waste material output documented in Rhode Island in 2006. However, C&D waste processing facilities report receiving 210,163 tons in 2006, as reported in Table RI3. This leaves the origin of 29,456 tons of C&D material unknown. Of the 52,566 tons of C&D fines used as cover at the RIRRC Central Landfill, the origin of 28,810 tons is not documented.

Recovered material reported to RI DEM includes 21,650 tons of wood chips sent to Maine and 9,951 tons of metal sent to other facilities located in Rhode Island. More detail on recovered materials and destinations is presented in Table RI5.

Table RI5
2006 C&D Waste Processors – Material Recovered & Destinations

State	Metal (tons)	Clean Wood (tons)	ABC (tons)	Fuel Chip (tons)	Other* (tons)
Maine				21,650	
Rhode Island	9,951	6,305	10,491		4,471
TOTAL	**9,951**	**6,305**	**10,491**	**21,650**	**4,471**

*Other includes: cardboard and railroad ties

Comparison of 2002 & 2006 Processing Data

According to RI DEM records, the total amount of C&D waste processed in Rhode Island in 2002 was 163,254 tons, with 126,782 tons originating in Rhode Island. This is significantly less than the 239,619 tons reported in 2006 (190,163 reported from Rhode Island sources). According to RI DEM records, Rhode Island exported 18,127 tons of C&D wood waste to Maine in 2002, not much less than the 21,650 tons sent in 2006.

Markets for Recovered C&D Waste Materials

As discussed above, recovered material in Rhode Island included mainly metal, ABC and wood. Table RI6 presents estimates of the generation rates for C&D waste materials; the quantity of materials recovered from C&D wastes in Rhode Island in 2006; and the difference.

Table RI6
Estimated 2006 C&D Waste Materials Generated & Recovered in Rhode Island

Material	Generated in Rhode Island (estimated tons)*	Recovered in Rhode Island (tons)	Difference (tons)
Plastics	4,043	NA	NA
Metals	10,108	9,951	157
Concrete and Rubble (ABC)	18,194	10,491	7,703
Drywall			
Construction (clean)	12,130	0	12,130
Demolition/Renovation (dirty)	8,086	0	8,086
Roofing	22,238	0	22,238
Wood:			
Unadulterated (e.g., construction scraps, pallets)	23,249	6,305	16,944
Adulterated (e.g., painted, engineered)	42,252	21,650	20,602

*Calculated based on the percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this Report) multiplied by the total quantity of C&D waste generated in Rhode Island in 2006.

Table RI6 shows that there is potential to increase reuse/recycling of most marketable materials in Rhode Island. Metal is the only material that is almost fully recovered from the waste stream. Data on plastic recycling from C&D wastes was not available. Some additional recovery of ABC is likely because it is considered an inert material and can be reused without entering a facility that reports data to RI DEM. At least a portion of the unadulterated, "clean" wood is probably recycled or composted at facilities that do not report it as C&D waste.

Data Caveats

There are significant C&D waste quantities and uses that are not captured in the information reported to RI DEM. For example, ABC is considered an inert material and can be used without entering a facility that reports data to RI DEM. Due to the nature of the hauling business, the quality of the numbers submitted from RI facilities that handle C&D wastes is variable and resources for forensic accounting are limited. Additionally, there is a gray area between C&D waste processing facilities and C&D waste separation facilities that has resulted in a revision to the Solid Waste Regulations in order to clarify the issue. The Solid Waste Regulation revision was not promulgated at the time of publication of this document, and therefore RI DEM continues to contend with this difficult issue.

Historic "demand" for landfill cover material substituting for virgin soil, resulted in a strong market for ground C&D waste, until the issue of hydrogen sulfide gas releases at landfills from wallboard became an odor and health concern for neighboring communities. Before the

wallboard-hydrogen sulfide relationship became an issue for C&D waste processors, the ground material moved quickly from the generation site to the landfill market. The largest landfill in RI willingly accepted the ground C&D waste and C&D screenings. Due to the hydrogen sulfide issues, the RIRRC (owner/operator of Central Landfill) required C&D facilities to test for gypsum content and stopped accepting C&D processed materials from other C&D waste facilities if the materials contained any gypsum. This caused a backlog inventory of material at the private processors. As a result, one of the licensed RI C&D waste processing facilities has recently stopped grinding C&D waste and has sold the grinding equipment. The company is currently only separating the C&D recyclables at the site.

Vermont

All certified solid waste management facilities submit quarterly reports to the Vermont Department of Environmental Conservation (VT DEC) Solid Waste Management Program. The reports document waste disposed, incinerated or treated, and are broken down by town and state of origin. For each waste type (e.g., C&D), the destination facility must be reported. If applicable, the facility must report on any wastes transferred for beneficial use in an in-state or out-of-state landfill, and that landfill must be identified, along with evidence of State approval for the beneficial use. Any wastes collected for off-site recycling must also be reported.

According to VT DEC records, enhanced by a review of other NEWMOA states' data, Vermont generated a total of 147,222 tons of C&D waste in 2006[1] that was managed at facilities that report to regulatory agencies, up 86.2 percent from 79,083 tons in 2002. This percentage increase is higher than documented by any of the other NEWMOA states. As with other states covered in this Report, the quality of the data reported to VT DEC in 2006 is likely to be improved since 2002. For example, loads containing municipal solid waste (MSW) and C&D waste were likely reported at MSW in 2002, and reported as such less often in 2006. Even with the significant percentage increase in generation, Vermont had the lowest per-capita C&D waste generation rate of any of the NEWMOA-member states in 2006, likely due to its rural nature and the lack of processing facilities, which may result in more reuse.

C&D Waste Disposal

The amount of documented C&D waste generated by Vermont that was disposed, either in Vermont or elsewhere, was 120,707 tons in 2006, or 82 percent of total generation. As shown in Table VT1, facilities in Massachusetts, New Hampshire, and New York reportedly received C&D wastes from Vermont for disposal in 2006: 348 tons, 5,412 tons, and 2,625 tons, respectively for a total of 8,385 tons. In addition to the amount disposed, 12,598 tons of C&D from Vermont was used as alternative daily cover (ADC) in New Hampshire (1,837 tons) and New York (8,259 tons), or as road base at landfills in Vermont (2,502 tons). Therefore, 86.7 percent of the C&D waste generated in Vermont that passed through a regulated facility in 2006 ended up in the landfill environment.

Table VT1
2006 C&D Waste Generated in VT & Disposed

State	Disposal (tons)
Massachusetts	348
New Hampshire	5,412
New York	2,625
Vermont	112,322
TOTAL	**120,707**

[1] The 2006 total was calculated using 112,322 tons generated in Vermont and disposed in Vermont facilities plus disposal data provided by Massachusetts (46 tons), New Hampshire (136 tons) and New York (2,625 tons), plus processor input data supplied by Massachusetts (94 tons) and New York (13,823 tons).

According to NYS DEC records, 3,213 tons of C&D waste was sent to disposal facilities in Vermont in 2006, so the total quantity of C&D waste disposed in Vermont was 115,129 tons.

Comparison of 2002 & 2006 C&D Waste Disposal Data

The documented quantity of C&D waste disposed in 2006 is up 60.9 percent from the 71,530 tons reported in 2002. In 2002, 6,762 tons were sent to disposal facilities in NEWMOA-member states and increased to 8,385 tons in 2006. In 2002, 404 tons of C&D waste imported to Vermont facilities for disposal compared to 3,213 tons reported in 2006.

C&D Waste Processing

There are no commercial processors of C&D waste located in Vermont. Some landfills in Vermont grind relatively small amounts C&D waste to make material used for roadbase at the landfill itself or exported for use as ADC at landfills in New Hampshire and New York. These landfill uses are included with the processing data presented in Table VT2. In 2006, 6,370 tons of C&D waste was used for landfill roadbase in Vermont, with 3,868 tons imported from New York. Another 8,259 tons of Vermont-generated C&D waste was used as ADC at landfills in New York, and 973 tons used as ADC in New Hampshire. In addition, 864 tons of C&D generated in New Hampshire was processed in Vermont and returned to New Hampshire for use as ADC.

Table VT2
2006 C&D Waste Processor Outputs & Destinations (tons)

State	Landfill Use	Total
New Hampshire	1,837	1,837
New York	8,259	8,259
Vermont	2,502	2,502

Finally, in 2006 processing facilities in Massachusetts report receiving 94 tons of C&D waste from Vermont, and New York facilities report receiving 13,823 tons. The ultimate fate of this material is unknown.

Comparison of 2002 & 2006 Processing Data

In 2002, 4,957 tons of Vermont-generated C&D waste was used as ADC in New Hampshire and 2,596 tons was used as landfill road base in Vermont. By 2006, landfill uses of C&D wastes generated in Vermont increased 67 percent to over 12,500 tons as discussed above. In 2002, processing facilities in Massachusetts reportedly received 24 tons from Vermont, and New Hampshire facilities received 520 tons. In 2006, Massachusetts processors reported receiving 864 tons, and New Hampshire reported receiving no C&D waste from Vermont. However, the most significant change was that in 2006 processing facilities in New York reported receiving 13,823 tons of C&D waste from Vermont.

Markets for Recovered C&D Waste Materials

While Vermont does not have any commercial C&D waste processing facilities, three used building material stores accept building materials for resale in Vermont. Two of these stores offer deconstruction services generating their own materials for reuse and recycling. VT DEC does not currently track the tonnages of the used building materials handled by these three

entities. In 2006, the category of C&D waste made up the largest percent of materials exchanged over the Vermont Building Materials Exchange (http://vbmx.net).

Table VT3 presents estimates of the generation rates for C&D waste materials.

Table VT3
Estimated 2006 C&D Waste Materials Generated & Recovered in Vermont

Material	Generated in Vermont (estimated tons)*
Plastics	2,944
Metals	7,361
Concrete and Rubble (ABC)	13,250
Drywall Construction (clean) Demolition/Renovation (dirty)	 8,833 5,889
Roofing	16,194
Wood: Unadulterated (e.g., construction scraps, pallets) Adulterated (e.g., painted, engineered)	 16,931 30,769

*Calculated based on the percent by weight as reported in the DSM Environmental Report, *2007 Massachusetts Construction & Demolition Debris Industry Study* (shown in Table 3 on page 9 of this Report) multiplied by the total quantity of C&D waste generated in Vermont in 2006.

As with the other states, there is potential to increase reuse/recycling of most marketable materials in Vermont. Data on plastic recycling from C&D wastes was not available. Some recovery of ABC is likely because it is considered an inert material and can be reused without entering a facility that reports data to VT DEC. In addition, at least a portion of unadulterated, "clean" C&D waste wood is likely recycled or composted in Vermont.

Data Caveats

C&D salvaged or recycled by contractors, deconstruction firms, homeowners, or exchanged on the Vermont Business Materials Exchange is not reported to VT DEC and not represented in the data in this report. Asphalt, brick or concrete (ABC) waste material is generally not processed through transfer stations or disposed of in regulated MSW or C&D landfills. ABC can be disposed in categorically-certified landfills of which there were about 20 active in Vermont in 2006. Property owners in Vermont can obtain one time only approvals for on-site disposal of this material. However, a significant amount of ABC waste is used as backfill on job sites without obtaining a one-time approval and therefore, VT DEC is not aware of all on-site disposal.