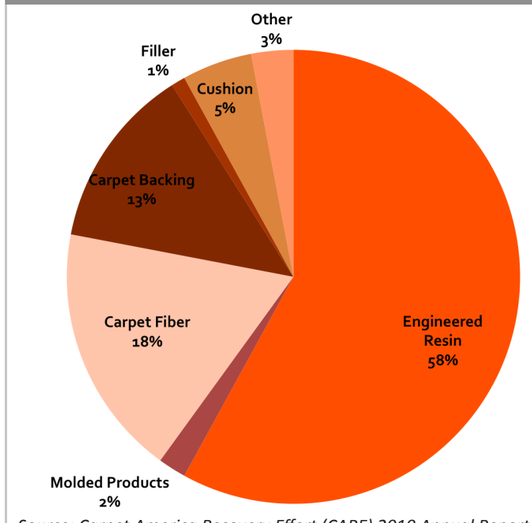
C&D waste provides a stream of material inputs for recycling operations. In addition, source reduction of construction waste can be achieved using specific building techniques and demolition waste can be reduced through deconstruction programs. The experience of our neighboring state of Massachusetts reveals that policy decisions, such as a disposal ban on certain C&D wastes (once viable markets are available) can further drive the availability of profitable recyclable material. This C&D recycling both generates revenue for businesses and cost savings for municipalities.

As one example, consider the Carpet Recycling Industry, which employed more than 1,000 people nationwide in businesses focusing on collecting, processing, sorting, and remanufacturing used carpet. The chart below shows the variety of end products produced from used carpet in 2010. Recycled carpet substitutes for virgin petroleum-based products, so as the price of oil continues to increase, recycled alternatives will see further cost advantages. However, EPA data indicates that only 9 percent of the carpets and rugs generated in the United States in 2010 were recovered for recycling. There is great potential for increased recovery and recycling of carpets and rugs. With Connecticut's nearest carpet recycler located in New Jersey, there is also potential to establish a more local recycler to serve our state and regional markets.

Connecticut currently has four permitted facilities that accept and process roofing shingles for recycling. As in other states, there is potential to turn recycled asphalt shingles (RAS) into asphalt road additives, road base, or new single additives. Shingles are easily separated from other forms of C&D waste, which increases their attractiveness as a candidate for recycling. It is estimated that approximately 3,000 tons of asphalt shingle waste are generated annually in Connecticut alone. Local market development for RAS facilities shows great potential to increase recovery.

Large demolition projects can also achieve significant cost savings and revenues though recycling. U.S. EPA reports estimate that recycling during the rebuilding of the Seattle Kingdome saved $3,000,000.[10] Salvage and recycling operations during the construction of the Four Times Square Office Tower in Manhattan is produced $800,000 in savings. Given these significant cost savings, potential for tightening of disposal policies, and improved technology and processes to produce useful recycled products, there is great hope for the future of the C&D recycling industry.

Recycled Carpet End Uses



Source: Carpet America Recovery Effort (CARE) 2010 Annual Report

Unlocking the Value of Paper

Connecticut generates 0.9 million tons of paper waste per year, of which 41 percent is recycled—the highest rate of recycling among all waste types representing approximately half of all waste materials recycled in the state. Corrugated cardboard, newspaper, office paper, and mixed paper account for approximately 85 percent of the total paper recycling. Of the 59 percent of paper waste not currently recycled, 40 percent can be recycled and 19 percent can be composted.[11] Paper such as tissues, napkins, paper towels, and paper plates cannot be recycled in the same way as other forms of paper, but depending upon its use, composition, and additives, some of it can be composted instead of being sent to a landfill or RRF. Although paper products account for the majority of recycling in Connecticut, opportunities exist to increase the recycling of paper products while optimizing the quality and value of the paper recovered.

The Key to Unlocking the Value of Recycled Materials

By measuring the flow of materials through business, cities, and towns of Connecticut, we can begin to identify and quantify the potential to transform what we now regard as waste into drivers of new products, new markets, new businesses, and new jobs as recommended in the State Solid Waste Management Plan.[12]

We invite you to rethink waste management here in Connecticut and in so doing help unlock the value of our materials economy. Please email us for more details about the project and to share your insights and recommendations.

Endnotes

[1,6] CT DEP, Connecticut State-wide Solid Waste Composition and Characterization Study, Final Report, May 26, 2010.
[2,4,11] CT DEEP, Estimates of Connecticut Municipal Solid Waste Generated (MSW), Disposed, and Recycled FY2010 Fact Sheet, February 2012.
[3] CT DEP, Identifying, Quantifying, and Mapping Food Residuals from Connecticut Businesses and Institutions: An Organics Recycling Planning Tool Using GIS, September 2001 (Prepared by Draper/ Lennon, Inc. and Atlantic Geoscience Corp.)
[5,8] NEWMOA, Construction & Demolition Waste Management in the Northeast in 2006, Report, June 2009.
[7] Towns of Groton and Stonington, Composting Commercial Food Waste in Volume-Based User Fee Towns: Pilot Collection and Composting of Source Separated Organic Materials from Commercial and Institutional Facilities in the Towns of Groton and Stonington, Final Report, July 2005.
[9] U.S. EPA, From Roofs to Roads: Recycling Asphalt Roofing Shingles into Paving Materials, Report, 1998.
[10] US. EPA, WasteWise Update: Building for the Future, Report, 2002.
[12] State of CT, State Solid Waste Management Plan, 2006.

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Photo credit: Anthony Clark

Hartford RRF Facility

Unlocking the Value: Transforming the Connecticut Materials Economy

Each year Connecticut residents and businesses generate more than three million tons of municipal solid waste (MSW, or "regular trash"). Currently existing recycling and reuse programs capture a portion of the value of Connecticut's waste, while waste-to-energy facilities process and recover energy from most of the MSW that is not recycled. With our recycling infrastructure under utilized, and resource recovery facilities at capacity, there is vast potential to transform our management and processing systems to further unlock the economic potential of waste.

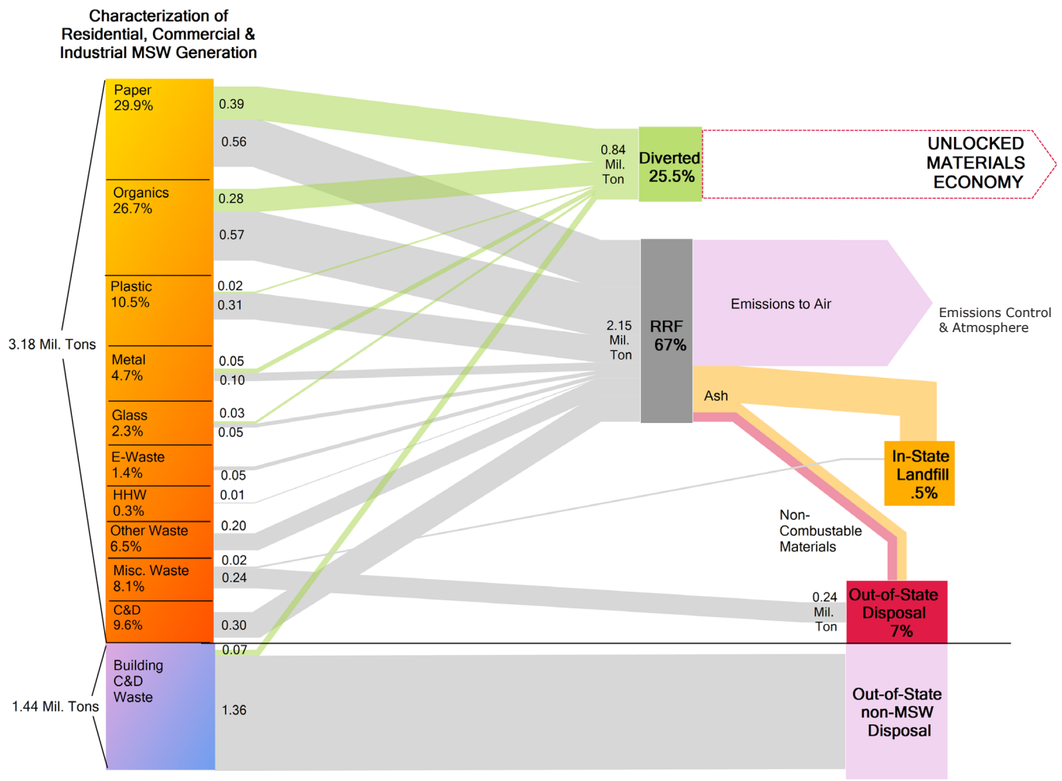
As policymakers and business owners both know, changes in the composition of the waste stream, changes in cost drivers for raw and used materials, constraints on the budgets of municipalities and states, and diversification and consolidation of industry players all present challenges and opportunities in transforming waste management. By looking closely at our handling of our evolving waste stream—particularly organics, paper, plastic, and construction and demolition materials—we can identify the portions of our waste stream most suitable for transformation. This transformation—the redirection of these materials from end-of-life disposal scenarios to second-life products—can create commodities of substantial economic and environmental value.

The Connecticut Department of Energy and Environmental Protection (DEEP) is working with the Yale University School of Forestry and Environmental Studies and stakeholders from around the state to identify these and other materials streams. After identification, the team is working to create actionable plans for capturing the value of these materials to benefit Connecticut's cities, towns, businesses, and residents. We invite you to explore this preliminary analysis, to seek your place in the transformation, and to contribute your input. Your input will assist our state in becoming a leader in sustainable and profitable waste management.

Unlocking the Value of Organic Materials

Representing approximately one-third of Connecticut's MSW stream, organic materials such as food scrap, leaves, grass, and compostable paper account for a combined 0.58 million tons of waste and are the single largest contributor to CT MSW disposed.[1,2] While Connecticut has been successful in implementing collection and recycling programs for leaves, grass, and brush, developing a system to divert food scrap from incineration has proven difficult. However, given that organic material is typically heavy and thereby contributes substantially to tipping fees, it makes economic sense to prioritize this high-volume and high-cost portion of the waste stream.[3]

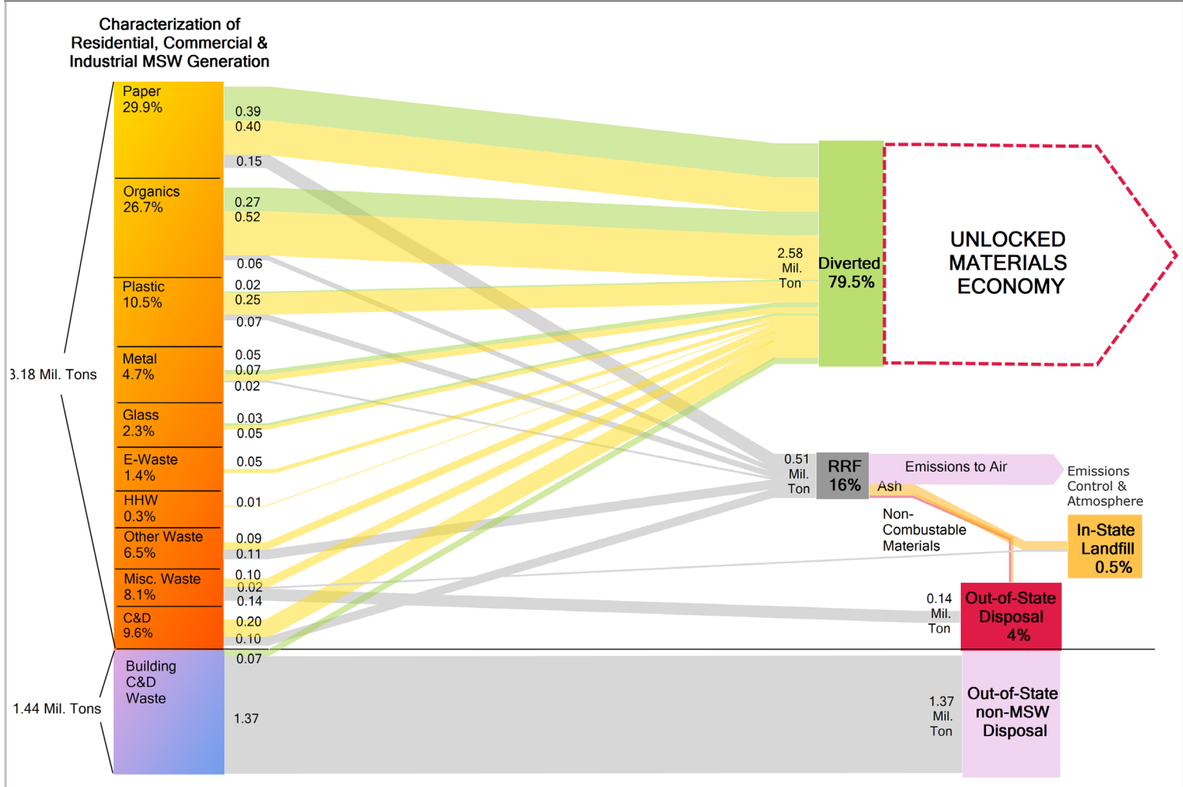
Existing Waste Management System in Connecticut (FY 2010, millions of tons)



The Sankey diagram above displays the actual processing of municipal solid waste (MSW) in Connecticut for fiscal year 2010. In 2010, the residential, commercial, and industrial sectors generated a reported 3.18 million tons of MSW. Of this waste, approximately 67.65 percent was sent to RRF facilities, 25.5 percent was diverted (i.e., either recycled or composted, this figure includes an estimate of 1.3% of home-composing and grass-cycling), 7.48 percent was sent out of state, and 0.67 percent was sent to in-state landfills.[4] Due to the separate processing of further recyclable materials through the Bottle Bill and battery recycling programs, the true material diversion rate is estimated at 33 percent. Thus, due to general under-reporting of diverted wastes as well as those of these separate programs, the values for diverted plastics, metals, glass, and e-waste are underrepresented in the diagram above. Additionally, 1.44 tons of building construction and demolition waste were processed separately in CT solid waste facilities in 2006, which has been used as a proxy for 2010 for lack of more recent data.[5] However, preliminary 2010 data suggests a decline in C&D waste generation, estimated as a 1/3 decrease in tonnage from 2006 to 2010, which may be attributed to the economic decline. Currently, although approximately 75 – 80 percent of our waste stream is deemed recyclable, only roughly one third is being diverted from disposal. With our in-state landfill capacity at its limit and the aging of technology in RRF facilities, it is time we rethink the system.

Reference note: The MSW composition data presented above was derived through combining percentages provided by the DEEP in its MSW Solid Waste Characterization Study (2010) and 2010 Estimates of Connecticut Municipal Solid Waste Generated (MSW), Disposed, and Recycled (2012) referenced in the endnotes.

"Unlocked" Waste Management System in Connecticut (FY 2010, millions of tons)



The Sankey diagram above represents the potential for "unlocking the materials economy" through increased redirection of materials towards recycling, composting, and material reuse rather than disposal. Based on the estimates in the 2010 waste composition study, nearly 55 percent of the materials currently sent to RRF facilities could be diverted.[6] A group of researchers from the Yale School of Forestry and the Connecticut Department of Energy and Environmental Protection are investigating the economic implications of this alternative "unlocked materials economy." Focusing on paper, organics, plastics, and C&D (four of the largest waste material streams by weight), the study will attempt to analyze the economic potential of a recycled materials economy in Connecticut.

Note: The estimates of increased material diversion represent the optimal recycling scenario, based on the general technical feasibility of recycling these materials. In the coming months, further analysis will be done to adjust these figures to the infrastructure and partnerships particular to the state of Connecticut.

Although the demand for finished organics-based products such as compost, mulch, and even biogas is high, the challenges of coordinating the collection and processing of food scrap remain persistent given the lack of processing capacity for this material. We are currently building upon the research, first conducted a decade ago, to map the density of food residual generators and the types of waste they generate. This continued research will enable Connecticut businesses and municipalities to harvest the value embedded in food scrap around the state.

Learning from Pioneering Composting Programs in CT

In 2002, the towns of Stonington and Groton received a DEP grant to collect and process food scrap produced by local restaurants, grocers, and tourist attractions. While officials overseeing the project estimated that the program diverted nearly half a million pounds of food scrap from the landfill or RRF, the program was not without its obstacles. For example, food scrap collected in winter sometimes froze to containers, food scrap collected in summer presented odor issues, and the long transportation distances required to deliver food scrap to out-of-state processing facilities resulted in unacceptably high costs.[7] By taking advantage of lessons learned a decade ago, and providing incentives to invest in local and regional compost processing facilities, Connecticut can become a leader in turning the costly problem of food scrap disposal into the driver of a new and sustainable business niche.

Anaerobic Digestion and a Sample Value Chain for Organics Processing

Anaerobic digestion is a process whereby organic materials such as food scraps, yard trimmings, and waste paper can be broken down in the absence of oxygen to produce useful resources such as biogas, compost, and mulch thereby creating economic and resource value at each link in the chain.

Organic Input: Food Waste, Yard Trimmings
Intermediate and End Products: Biogas, Compost, Mulch
Processed Material Uses: Energy, Agriculture, Landscaping, Gardening

Unlocking the Value of Construction and Demolition Materials

Construction and demolition (C&D) waste comprises a diverse group of materials, including plastics, metals, gypsum, wood, carpet, shingles, concrete, and other debris; some of these materials, such as carpet, are also part of the over-sized MSW waste stream. Generation of C&D waste can be affected by a variety of external factors, including economic conditions and the frequency and severity of natural disasters. In 2006, approximately 1.44 million tons of Connecticut C&D waste passed through in-state solid waste facilities.[8] However, preliminary 2010 data indicates that tonnage may have dropped by about one-third, likely due to the economic downturn.