

Prepared for:

**Connecticut
Resources Recovery
Authority**

Executive Summary

**The Economic Impact on Connecticut from
Recycling Activity**

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Table of Contents

Table of Contents ii

Table of Figures: iii

 Recycling Contributes to Connecticut’s Economy 1

 Summary of Impacts by Type..... 2

 Distribution of Impacts by Industry 5

 Components of Recycling Activities 7

 Contributions from Connecticut Resources Recovery Authority 9

 Modeling the Economic Impacts of Recycling in Connecticut 11

Table of Figures:

Figure 1: Total Direct, Indirect, and Induced Impacts in Connecticut from All Economic Activity Associated with Recycling Activity in Connecticut, 2006-2012.....	3
Figure 2: Direct, Indirect, and Induced Estimates from Connecticut’s Recycling Industry, Output, and Employment, 2006-2012.....	4
Figure 3: Employment from the Indirect and Induced Impacts from the Economic Activity Associated with Connecticut’s Recycling Industry	5
Figure 4: Indirect and Induced Impacts on Output from the Activity of the Recycling Industry in Connecticut, 2006-2012	6
Figure 5: Total Impact on Output from Recycling by Type of Activity, 2006-2012	7
Figure 6: Total Economic Impact on Connecticut’s Output from CRRA Recycling Activities, 2006-2012 (Millions 2012 \$)	10
Figure 7: Total Economic Impact on Connecticut’s Jobs from CRRA’s Recycling Activities, 2006 - 2012.....	11

Recycling Contributes to Connecticut's Economy

Most of us like the idea of finding new and appropriate uses for things we thought we were done with. This is true whether we are a business or a household. Businesses that focus on profits know that finding a way to reuse materials can make them money. Households don't often recognize the value-added they provide to the economy by choosing to recycle; however their contribution can be significant to the overall well-being of the economy of the region as well as improving the environment of the region. In 2012, the impact on Connecticut's economy, as measured in total sales due to recycling activity, is estimated to be over \$746 million. Over seven years, from 2006 through 2012, this impact is estimated to be nearly \$5.17 billion. Other measures of the overall economic activity associated with Connecticut's recycling activities in 2012 are estimated to include:

- Employment over 4,800
- Total value-added of \$469 million, which includes:
 - Labor income more than \$275 million
 - Indirect business taxes of nearly \$59 million
 - Other profit-type income of more than \$134 million

While these numbers are substantial, they are conservative estimates of the overall impact of all aspects of the recycling activities in Connecticut. This conservative nature is a result of a the complex market structure of recycling in Connecticut which results in some dimensions associated with recycling not being classified in recycling or easily associated with that activity. Among these factors include efficiencies associated with some of the aspects of recycling which are not quantifiable but reduce costs, the economies associated with various reduced and avoided waste disposal requirements, and

the economic values residents attach to having less land taken up with landfills or other waste disposal facilities.¹ However, this analysis has been as thorough as possible in accounting appropriately for all available data. Within the structure of Connecticut's economy this analysis was developed to provide a measure of the economic impacts associated with Connecticut's recycling activity for each year from 2006 through 2012. In addition, the following report extends this analysis to include an examination of the contributions of the Connecticut Resources Recovery Authority (CRRA). CRRA fills a critical role in overseeing an efficient materials recycling facility within the state and providing its knowledge to inform state policy. CRRA also provides an experiential and educational component of recycling in Connecticut through the CRRA Trash Museum.

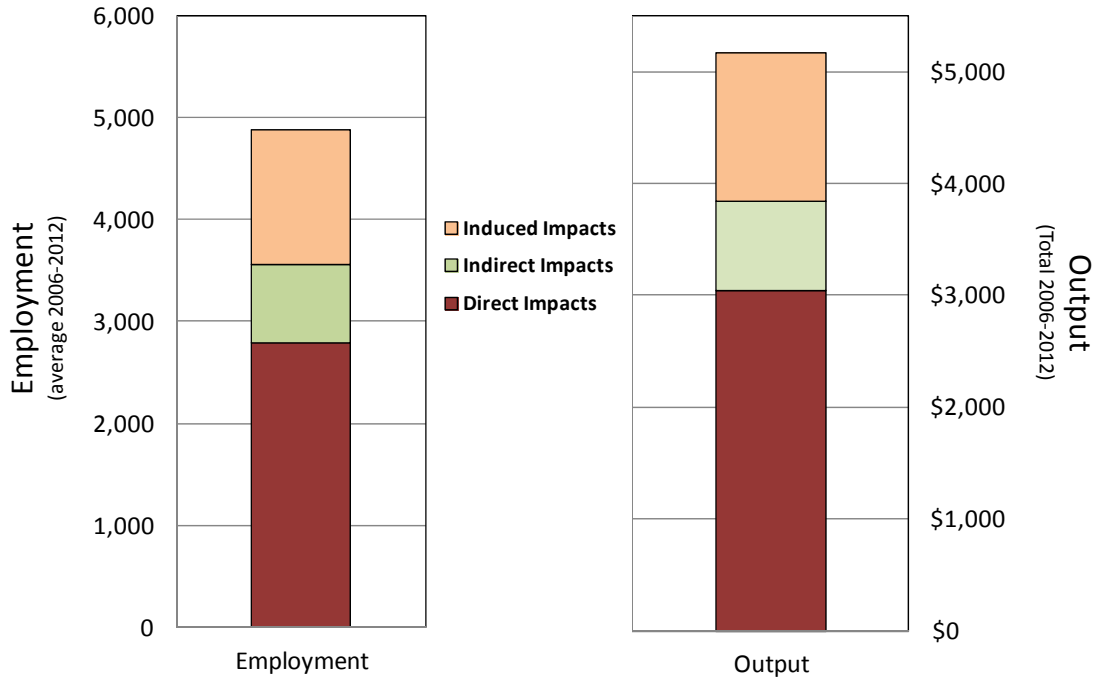
Summary of Impacts by Type

The total impacts presented throughout this report are the accumulation of the direct, indirect and induced impacts as estimated by the IMPLAN input-output model. The direct effects are the basis of the economic activity modeled and are shown in Figure 1 as the foundation of the total impact analysis. They are based on known or estimated data from various sources that informs the economic impact model. For the statewide analysis

¹ One additional factor that significantly contributes to the conservative nature of this analysis is that composting activity is not included for this analysis. Composting activity was not included because it is undergoing some significant change and can be extremely variable depending on environmental conditions. For example, the two storms in 2012 created a significant number of jobs that would be associated with composting. However, a comprehensive estimate of total recycling jobs that included composting was estimated for 2010. For that year, in addition to the 2,697 direct jobs associated with all other aspects of recycling, total employment directly associated with composting was estimated by DSM Environmental to be 257. These jobs in turn created a total of 139 additional jobs resulting in a total of 5,122 jobs across the state that can be associated with the recycling industry once the composting activity is included. The total impact on labor income (employee compensation and proprietors' income) estimated in 2010 from all activity including the 257 composting jobs exceeded \$284 million with a total value added of \$490 million (2012 \$).

much of the data comes from the U.S. Census Bureau’s County Business Patterns data. Thus, for example the direct effects for the Materials Recovery Facilities (MRFs) were primarily based on employment as observed in NAICS² industry 56292 and the data for Recyclables Material Wholesalers from NAICS industry 42393.

Figure 1: Total Direct, Indirect and Induced Impacts in Connecticut from All Economic Activity Associated with Recycling Activity in Connecticut, 2006-2012



Source: U.S. Census Bureau-County Business Patterns, DSM Environmental, IMPLAN, CERC Estimates

These direct impacts then ripple through the economy creating additional activity. The IMPLAN input/output model captures the next level of activity as the indirect impacts. The indirect impacts measure the accumulation of the purchases from other industries within the state of Connecticut that are needed to provide for the level of economic activity specified in the direct effects. The ripples furthest from the direct activity are the

²NAICS stands for the North American Industry Classification System which is used by businesses and governments to classify business establishments according to the type of economic activity or production they engage in.

induced impacts. The induced effects are based on the change in income that would occur from the direct and indirect economic activity.

The economic impact multiplier is the ratio of all three effects (direct, indirect and induced) to the initial direct effects. The size of the multiplier is dependent on the region’s industry structure; specifically the types of inputs used for that industry’s production function that are provided from sources within the region and the labor income in those industries.

Figure 1 graphically presents the data in Figure 2 which shows that the total direct employment estimated from the activities included in this impact analysis for the recycling industry in Connecticut averages 2,710 per year while the total direct output from this industry between 2006 and 2012 is estimated to be \$3,045 million. The indirect impact on Connecticut’s employment estimated by the IMPLAN model is that an additional 755 employees are required across the state to provide goods and services to the activities associated with recycling. The total sales associated with these employees over the seven-year period are estimated to be \$791 million.

Figure 2: Direct, Indirect, and Induced Estimates from Connecticut’s Recycling Industry, Output, and Employment, 2006-2012

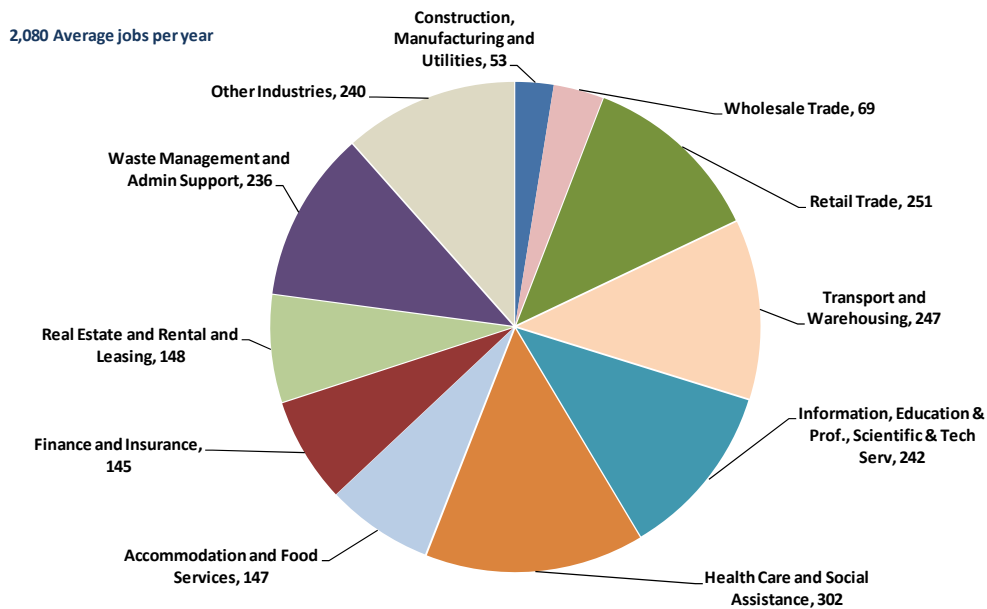
	Total Output (Millions 2012 \$)	Employment (average 2006-2012)
Direct Impacts	\$3,045	2,710
Indirect Impacts	\$791	755
Induced Impacts	\$1,332	1,325
Total Impacts	\$5,168	4,790
Multiplier	1.70	1.77
Source: U.S. Census Bureau's County Business Patterns DSM Environmental, CERC, and IMPLAN 2010		

The total additional employment in Connecticut’s economy due to the increase in household incomes associated with the direct and indirect activities of recycling activities modeled in this analysis was 1,325 while the increase in output over the seven years was estimated to be \$1.332 billion.

Distribution of Impacts by Industry

The economic impacts from the recycling industry reach into all other industry sectors within the state. This activity provides economic activity across the state to companies in a diverse set of industries and can be measured in output (total sales and the net change in inventory), employment, and value-added. Value-added is a measure that includes employee compensation, proprietors' incomes, indirect business taxes, profits and other property-type income. Figure 3 shows the average number of Connecticut jobs necessary to provide for the recycling activity in the state from each of the major industry sectors. These are jobs for production that either contributes to the recycling industry or are created due to the consumer expenditures of labor income that is associated with recycling.

Figure 3: Employment from the Indirect and Induced Impacts from the Economic Activity Associated with Connecticut's Recycling Industry



Source: U.S. Census Bureau-County Business Patterns, DSM Environmental, IMPLAN, CERC Estimates

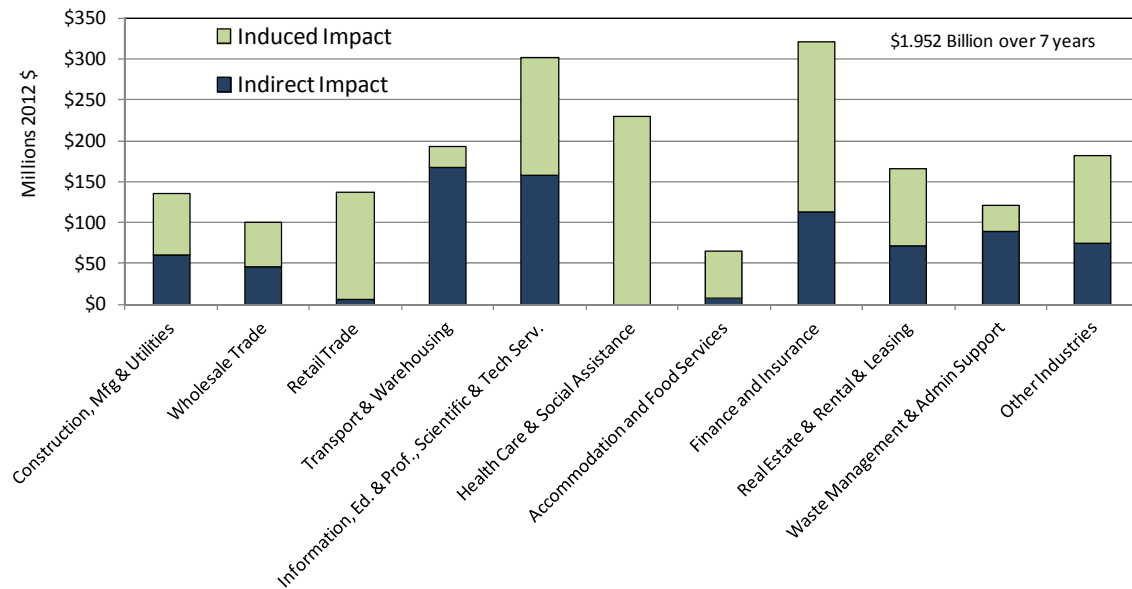
The annual average of total number of jobs associated with the secondary impacts (the indirect and induced impacts) of the recycling industry in Connecticut was 2,080. Some of the industries with the most indirect jobs include

- Transportation and Warehousing;

- Professional, Scientific and Technical Services; and
- Information.

As is common with induced impacts the industries with the most number of jobs includes Retail Trade, and Accommodations and Food Services. Figure 4 shows the total over seven years of both secondary (indirect and induced) impacts as measured by the total value of sales by industry sector within Connecticut that were associated with the economic activities of Connecticut’s recycling industries. The deep-blue sections of the bars used in the graph shown in Figure 4 represent that industry’s part of the \$791 million of output in indirect impacts as shown in Figure 2. The light-green sections of the bars shows that industrial sector’s total of the \$1.332 billion (Induced impacts) estimated by the IMPLAN model to be the change in total sales in Connecticut due to the income associated with recycling activity over seven years.

Figure 4: Indirect and Induced Impacts on Output from the Activity of the Recycling Industry in Connecticut, 2006-2012

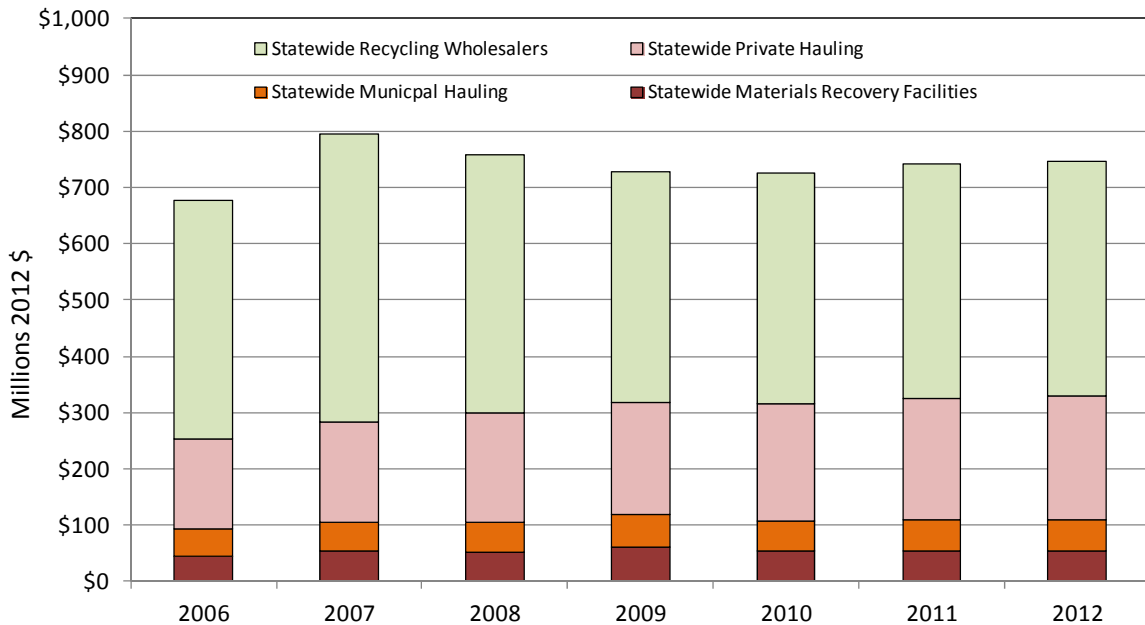


Source: U.S. Census Bureau-County Business Patterns, DSM Environmental, IMPLAN, CERC Estimates

Components of Recycling Activities

This impact analysis explores the total economic impact of the recycling industry at the state level and also the impacts associated with the Connecticut Resources Recovery Authority (CRRRA). For both of these impacts the specific activities for each year were analyzed independently. Thus for the statewide impact the components analyzed included the state’s MRFs; the collection, hauling and transfer-station activity associated with bringing recyclable materials to the facilities; and the state’s Recyclable Materials Wholesalers industry. The basis for the activity associated with the collections and hauling was estimated by DSM Environmental, an internationally recognized consulting firm with experience in all aspects of resource recovery and solid waste management. DSM Environmental has done considerable work in Connecticut and is currently engaged by the Governor’s Working Group on Modernizing Recycling. Figure 5 presents the total of the direct, indirect and induced impacts associated with recycling by the type of activity on output from 2006 through 2012.

Figure 5: Total Impact on Output from Recycling by Type of Activity, 2006-2012



Source: U.S. Census Bureau-County Business Patterns, DSM Environmental, IMPLAN, CERC Estimates

In studying Figure 5 it is important to recognize that it presents a simplified graphic of a larger number of activities that work together to fill in a rather complex market within the state of Connecticut. While there are still pieces of the recycling market such as food and other organic composting that can be filled in, and additional expansions in recycling in many of the areas already present, the various pieces of the state's recycling puzzle are put together in economically-sound ways. Where the market supports recycling, private independent wholesalers collect and re-sell materials on the international market. These recycled materials become resource inputs for industries and because they use less energy, decrease the carbon footprint of manufacturing and put downward pressure on the prices of natural resources which in the long run will decrease prices to consumers. On average, they account for about 60 percent of the total impact and because they operate in a competitive market and sell most of their output outside of the state they naturally focus on efficient production and through their activity bring additional wealth into the state.

The focus of the second part of the recycling market is on the materials recovery facilities. It is within this industry that the Connecticut Resources Recovery Authority operates and accounts for between 30 and 40 percent of the state's total industry employment. Although MRFs engage in recycling activities that extend beyond recycling materials from households (including governments, schools and some businesses) much of their activity is associated with providing opportunities for households to recycle. As noted in Figure 5 the direct activity of the state's MRFs accounts for only around seven percent of the total state recycling activity, yet this seven percent still accounts for more than \$53 million in sales (385 jobs) in the state. In addition, the collecting and hauling of recycled materials from generators (households, governments, schools and businesses) directly requires an estimated 969 jobs (yearly average for 2006-2012). This activity creates a total impact on the state's economy that accounts for slightly more than 1,803 jobs each year. Figure 5 shows this activity, which includes both the municipally-run and private contractors that collect recyclables from households, accounts for an average of 33 percent of the total statewide impact on recycling when measured in output. As noted previously the direct effects on collections and hauling, that drive this aspect of the overall recycling activity, were provided by DSM Environmental which has worked on

recycling and waste management in the state for a number of years and was able to use detailed recycling data from the State Department of Energy & Environmental Protection as well as data from recent surveys in developing these estimates. Within the recyclable hauling activity government contractors are estimated to account for around 18 percent of the total impact on output from hauling activity from 2006 through 2012 while private haulers account for the remaining 82 percent.

In total dollars the output associated with hauling in the state increased from about \$207 million in 2006 to slightly more than \$260 million in 2010 due to the advent of single-stream recycling in 2008. Since 2010, that growth was estimated to increase by nearly \$13 million based on the continual increase in use of single-stream activity and an increase observed in employment in the hauling industry.

Contributions from Connecticut Resources Recovery Authority

The Connecticut Resources Recovery Authority (CRRA) provides a number of benefits for the State of Connecticut above and beyond those provided by other MRFs in the state. Its mandate is to work for and in the best interest of the municipalities of Connecticut to find best practices for managing their solid waste. Since its founding in 1973 CRRA has fostered the evolution of the state's solid-waste management system, replacing town dumps with single-stream recycling and trash-to-energy facilities. One of CRRA's innovative undertakings has been the development of recycling educational programs and, specifically, the CRRA Trash Museum in Hartford. CRRA also contracts and oversees the MRF in Hartford which has served as many as 82 municipalities. Overseeing this system allows it to gain valuable information on best practices and efficient methods for handling materials recovery.

The total impact from 2006 through 2012 from CRRA was:

- \$883 million in total output (2012 \$)
- 861 jobs per year
- \$529 million in total value-added (2012 \$)
 - which includes labor income of \$362 million (2012 \$)

The inputs for this analysis include CRRA’s marketing activities, its operation of the CRRA Trash Museum, its capital investments and the daily operating employment of its contractor at the Hartford MRF. Hauling activities were based on the estimates provided by DSM Environmental and shared out to CRRA based on its share of total industry employment. Although recycled tonnage would have been a better estimator of CRRA’s hauling share, state totals to compare to CRRA’s tonnage were not readily available at the time of this report. These impacts are more detailed than those used to generate the state impact estimates and do not include Recycling Wholesale activity because CRRA is not involved in or classified in that industry. However, the impacts associated with CRRA can be thought of as providing parallel estimates to the statewide examination previously presented. For this analysis CRRA provided costs and expenditures associated with its operations and those of the contractor that operates the Hartford facility from 2006 through 2012.

Figure 6 presents the aggregate of the impacts on Connecticut’s output that are associated with CRRA’s recycling and educational activity from 2006 through 2012.

Figure 6: Total Economic Impact on Connecticut’s Output from CRRA Recycling Activities, 2006-2012 (Millions 2012 \$)

	2006	2007	2008	2009	2010	2011	2012	7 Year Total
CRRA Recycling Total Impact	\$96.9	\$85.0	\$109.7	\$121.3	\$128.6	\$154.3	\$137.4	\$833.2
CRRA Admin & Education	\$3.2	\$4.0	\$4.5	\$4.2	\$3.4	\$2.6	\$2.5	\$24.4
Education	\$1.1	\$1.0	\$1.5	\$1.6	\$0.6	\$0.6	\$0.7	\$7.2
Mid-Connecticut Facility	\$27.4	\$13.9	\$18.3	\$20.1	\$21.6	\$38.7	\$23.2	\$163.3
Collecting and Hauling	\$66.3	\$67.1	\$86.9	\$97.0	\$103.6	\$112.9	\$111.7	\$645.5

Source: IMPLAN, CRRA, DSM Environmental, CERC

The largest output impact associated with CRRA’s recycling activities is the collecting and hauling component which was estimated to account for nearly \$646 million, or 77 percent of the entire economic impact. This includes the Connecticut-wide sales of the inputs required for collecting and hauling as well as the expenditures from the income associated with this activity.

The total impact on employment in Connecticut associated with CRRA’s recycling activities includes an average of 653 jobs each year in collecting and hauling and 179 jobs from the activity of the contractor at the Hartford MRF.

Figure 7: Total Economic Impact on Connecticut’s Jobs from CRRA’s Recycling Activities, 2006 - 2012

	2006	2007	2008	2009	2010	2011	2012	Average Jobs per Year
CRRA Recycling Total Impact	683	600	804	841	950	1,145	1,014	862
CRRA Admin & Education	27	34	38	36	30	23	21	30
Education	9	9	13	14	5	5	6	9
Mid-Connecticut Facility	198	108	143	157	168	301	181	179
Collecting and Hauling	457	458	623	648	752	820	812	653

Source: IMPLAN, CRRA, DSM Environmental, CERC

Modeling the Economic Impacts of Recycling in Connecticut

The above assessment of the economic activity across the State of Connecticut from the impact of recycling activity is based on a comprehensive economic impact analysis developed by the Connecticut Economic Resource Center, Inc. (CERC), at the request of CRRA. Using the IMPLAN input/output economic impact model, CERC analyzes and presents in this report estimates of the economic impacts that accrue across the State of Connecticut due to the following activities.

1. **The initial direct spending associated with the employment and payroll for collecting the recyclable materials from “generators,” primarily Connecticut’s households, to the MRFs.** These annual impacts were primarily driven employment or jobs estimates provided by DSM Environmental. This activity was modeled in the Transportation by Truck IMPLAN industry.

2. **The initial direct spending associated with the employment and payroll observed from the ongoing activities in the MRF industry (NAICS industry 56292).** The primary data source for these establishments was the U.S. Census Bureau’s County Business Patterns from 2006 to 2010. Because the 2011 and 2012 data from County Business Patterns is not available the change in employment for the MRF industry for 2011 and 2012 were estimated. The change from 2010 to 2011 was based on the published change in the aggregate Waste Management and Remediation Services industry (NAICS industry 562) by Connecticut’s Department of Labor data. For 2012 the growth rate observed from 2010 to 2011 was assumed to slow to half that rate for that industry between 2011

and 2012. Because the best available industry in the IMPLAN model for this industry is the larger Waste Management and Remediation Services (IMPLAN Industry 390), CERC revised the IMPLAN production function to better reflect the purchases of goods and services, and the payrolls and output-per-worker ratios of the MRF industry.

- 3. The direct spending associated with the employment and payroll observed from Connecticut's Recyclable Material Merchant Wholesalers (NAICS industry 42393).** The primary data source for the data of these establishments was the U.S. Census Bureau's County Business Patterns from 2006 to 2010. For 2011 the growth rate in employment from the two-digit Industry Wholesale Trade observed from 2010 to 2011 in the Connecticut's Department of Labor data was used to estimate the growth rate from 2010 to 2011 for employment. For 2012 a conservative estimate that halved the 2010 to 2011 growth rate was applied.

Using the "multiplier effect," applied in all economic impact analyses, the IMPLAN model estimates the indirect effects associated with the increases in production within the state. These indirect effects are from the companies within the state for the specific industries that provide the goods and services necessary to produce the level of output specified by the direct spending. The IMPLAN model then estimates the induced impacts, which result from the increase in household income due to the increase in production observed in the direct and indirect effects.

In summary, this analysis, which is admittedly conservative in its approach to estimating the total impact in Connecticut due to recycling, observes that the recycling industry in Connecticut directly contributes \$435 million in sales and provides for more than 2,710 jobs in the state's economy. As this activity ripples through the state and across all industries due to purchases of goods and services to support all aspects of recycling and then as workers in all this activity spend their income across the state this activity grows so that on average between 2006 and 2012 it accounts for more than \$738 million in total sales and 4,790 jobs per year. In addition to these significant economic impacts, the comprehensive structure of this activity takes full advantage of free-market structures where possible and provides for

efficiently managed recycling solutions for households and other institutions in situation where the function of the market is weakest.

The largest and most active component of recycling activity for households in Connecticut, CRRA contributes nearly \$120 million in output on a year-on average once the collecting, hauling, handling and educational activities of the Authority are taken into account.

Finally, as noted in at the start of this report, some of the best values associated with Connecticut's recycling activities, smaller landfills, more open space, and allowing the state's residents to appropriately dispose of their waste are benefits from recycling that are not quantifiable but positively enhance our well-being.