

# CARPETAMERICARECOVERYEFFORT<sup>SM</sup>

*Developing market-based solutions for the recycling and reuse of post-consumer carpet*

Annual Report

2002



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# CARPET AMERICA RECOVERY EFFORT<sup>SM</sup>

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## Message from Frank Hurd, Chairman of the Board

### Carpet America Recovery Effort (CARE)

We have just finished the first year of the Carpet America Recovery Effort (CARE), the voluntary initiative of the carpet industry and government to prevent carpet from burdening our nation's landfills. CARE was created as a result of a Memorandum of Understanding for Carpet Stewardship (MOU), a national agreement signed in January 2002 by members of the carpet industry, government entities and non-governmental organizations (NGOs). The agreement established national goals over a ten-year timeframe to significantly increase the amount of recycling and reuse of post-consumer carpet<sup>1</sup>. By 2012, the parties plan to achieve a landfill diversion goal of 40%.



Pursuant to the MOU, CARE is responsible for tracking the progress toward the national goals for carpet recovery. This report is the first in a series of annual reports, which will show progress toward our ten-year goals.

This has been an exciting and trying year. As with any new endeavor, CARE has met with successes as well as missteps along the way. We hope this report will help our readers understand and appreciate the accomplishments and challenges that faced CARE during our first year. Despite numerous obstacles, the members of CARE have remained steadfast in their commitment to find innovative, market-based solutions for the recycling and reuse of post-consumer carpet. The successes of this first year indicate a promising start to an exciting endeavor.

I want to thank all who have worked so hard on CARE this year with a special thanks to the Board of Directors, many who have worked tirelessly to make this year a success. There are two people on the staff of The Carpet and Rug Institute (CRI) that need special recognition - Linda Harrington for keeping CARE on target administratively and Joan Seelaus who not only put together the CARE web site but was instrumental in compiling this first report. I am indebted to both of them, who have been key to CARE's first year successes.

I am excited about the future – I am convinced we can exceed our goal of 40% landfill diversion by 2012 if all of those involved in CARE continue to work together towards our common goal.

I look forward to reporting even greater progress in the coming years.

Frank K. Hurd  
Chairman  
Board of Directors

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<sup>1</sup> *post-consumer* = a material or finished product which has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item

## Executive Summary

CARE's goal for diverting post-consumer (PC) waste carpet from landfills in 2002 was approximately 178 million pounds, or 3.8% of total discards for that year. According to surveys conducted by the University of Georgia (UGA), companies reported a diversion rate of 1.22% during 2002, a deficit of 2.58%. It is disappointing that the reported diversion rate fell short of the CARE goal, however, the survey data only represents a small fraction of the carpet currently in the national waste stream. Only 7.6% of manufacturers and 5.9% of handlers/recyclers responded to the UGA survey. The numbers in this report must be considered preliminary and conservative. Despite the low response rate, underreporting would suggest that *actual* diversion - including activities never reported to CARE - is much higher.

The data collected indicates that over 96% of the diverted PC carpet waste went to recycling and reuse. Only 3% went to waste-to-energy applications. Carpet as an alternate fuel for cement kilns is still at least a year away. Post-industrial/pre-consumer<sup>2</sup> (PI) carpet waste represents the lion's share of the reported diversion. Appendix A reports on PI carpet diverted from landfills.

Of the many challenges facing CARE, first and foremost is that PC carpet waste is still not considered a valuable feedstock; PI is the preferred option. Marketing of recycled-content products is a CARE priority. The collection infrastructure was also dealt a blow when the Evergreen Nylon Recycling Facility closed in 2001. This setback, coupled with low tipping fees in much of the country, has made landfilling the preferred option for disposing of PC carpet. Fiber identification, while adequate for current operations, poses a challenge if the recycling efforts are to expand. All of these factors are compounded by the economic downturn which has dampened consumers' interest and demand for recycled products.

One lesson CARE learned this year is that companies are not always willing to provide their data, unless directed by government regulation or legislation. CARE hopes to alleviate this problem by successfully demonstrating the confidentiality of the reporting. Also, CARE will work to simplify the survey and expand the survey base to include more players in the collection infrastructure.

Government survey results indicate that carpet recycling is not a high priority for solid waste managers at the state or federal level. Lack of funding was clearly an impediment to increased activity. Existing efforts mainly focused on small business assistance. State governments requested action on development of procurement guidelines to assist in their efforts to encourage recycling.

Over the year CARE has had many successes. It incorporated as a 501(c)3 non-profit organization, and established a Board of Directors and four primary committees. CARE's web site continues to provide up-to-date information about CARE's activities. CARE has been able to foster numerous entrepreneur relationships, and will be able to provide financial support to promising entrepreneurs through the sponsorship program.

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<sup>2</sup> *post-industrial/pre-consumer* = waste materials generated from an industrial or manufacturing process; does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

## Evaluation of Progress Toward the National Goals for Carpet Recovery

In 2002, approximately 4.7 billion pounds of post-consumer waste carpet were discarded.<sup>3</sup> Land disposal, or landfilling, is by far the most common disposal method (95%). National concerns about disposal capacity, combined with carpet's bulk (which makes it difficult and expensive to handle), have contributed to the search for alternative means for carpet disposal. While most components that make up carpet are recyclable or reusable, only about 5% of waste carpet currently gets handled in these ways. Increasing recycling and reuse would reduce waste and recover valuable resources.

The negotiated goals set forth in the MOU include escalating goals for recycling and reuse - the first step in the eventual elimination of land disposal and incineration of post-consumer (PC) carpet.

Tables 1 and 2 represent CARE's goals for diverting PC waste carpet from landfills. Table 1 shows a gradual increase in the amount of carpet diverted from landfill over a ten-year period, expressed in pounds. By 2012, CARE's goal is to divert from landfill a minimum of 2.7 billion pounds of waste carpet, or 40%,<sup>4</sup> through various management methods: reuse, recycling, waste-to-energy (WTE), and cement kilns.<sup>5</sup> Table 2 shows the target diversion rate for each management method, expressed as a percentage of the total amount of carpet discarded.

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<sup>3</sup> Currently there is no method to accurately measure the amount of carpet sent to landfills, nor are there any plans to do so in the foreseeable future. The numbers derived for CARE's purposes (from 2002 through 2012) are estimates, calculated based on the total number of yards shipped from 1988 to 1999, and an average 13-year life expectancy of carpet

<sup>4</sup> The goals, as stated, do not add up to 40%. The goals for individual management methods are expressed in a range to allow some flexibility to achieve and potentially exceed the 40 percent overall diversion goal.

<sup>5</sup> Definitions are taken from The Carpet and Rug Institute Environmental Claims Certification Glossary of Terms:

*reuse* – using a material, product or component of the waste stream in its original form more than once  
*recycling* – recovering products or other materials from the solid waste stream for use in the form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion  
*waste-to-energy* – a form of waste incineration where combustion of waste is used to produce heat or power  
*cement kilns* – where waste carpet is used as a fuel source for cement kilns

**Table 1: National Goals for Post-Consumer Carpet Recovery**

Figures rounded to millions of pounds. Data on carpet discards provided by the Carpet and Rug Institute.

<b>Disposal Method</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
Total Discards	4,678	4,828	4,537	5,038	5,261	5,590	5,642	5,887	6,020	6,605	6,772
Reuse				25			113		211		203-339
Recycling	180			353			620		903		1,354-1,693
Waste-to-Energy (WTE)		48	45	50	53	56	56	59	60	66	68
Cement Kilns				100			300		200		200
Landfill	4,498			4,510			4,552		4,646		4,812

**Table 2: Landfill Diversion Goals for Post-Consumer Carpet Using Different Management Methods**

Expressed as a percentage of the total pounds of carpet discarded.

<b>Disposal Method</b>	<b>2002</b>	<b>2005</b>	<b>2008</b>	<b>2010</b>	<b>2012</b>
Reuse	-	0.5%	2.0%	3.5%	3-5%
Recycling	3.8%	7.0%	11.0%	15.0%	20-25%
Waste-to-Energy (WTE)	-	1.0%	1.0%	1.0%	1%
Cement Kilns	-	2.0%	5.3%	3.3%	3%
Total landfill diversion rate for all disposal methods	3.8%	10.5%	19.3%	22.8%	27-34% <sup>6</sup>

Through CARE, carpet industry members and government entities are jointly responsible for monitoring, assessing, and reporting on the progress toward the national goals for carpet recovery. Stakeholders outside the carpet industry assist with data collection, analysis, and program evaluation to ensure transparency in reporting. For the year 2002, CARE engaged the services of the University of Georgia (UGA) to compile information about the amount of carpet diverted from landfills. UGA's Department of Textiles, Merchandising and Interiors (TMI), with input from the CARE Board of Directors, designed a pilot study to obtain baseline data which will be used for comparison purposes in future yearly assessments.

<sup>6</sup> The goals, as stated, do not add up to 40%. The goals for individual management methods are expressed in a range to allow some flexibility to achieve and potentially exceed the 40 percent overall diversion goal.

## Quantitative Assessment of Landfill Diversion

UGA gathered data about the amount of waste carpet diverted to reuse, recycling, WTE and cement kilns from January to December of 2002. Surveys were sent to 237 U.S. carpet and fiber manufacturers and 85 reclaimable materials handlers<sup>7</sup> and recyclers.<sup>8</sup> Of the 18 manufacturers and 5 handlers/recyclers that provided useable data,<sup>9</sup> these groups reported over 57 million pounds of PC waste carpet diverted from landfill through reuse, recycling, and WTE (Table 3). Handlers and recyclers accounted for 70.1% of this diverted waste, and manufacturers accounted for 29.9%. Recycling and reuse together accounted for over 96% of the PC waste carpet diverted from landfill.

**Table 3: Post-Consumer Waste Carpet Diverted from Landfills in 2002 Reported by Carpet and Fiber Manufacturers, Waste Handlers and Recyclers in the 2002 CARE Survey (in pounds)**

	Reuse	Recycle	Waste-to Energy	Cement Kilns	Total
Manufacturers	9,058,634	6,123,127	1,905,660	0	17,087,421
Handlers/ Recyclers	0	40,080,000	0	0	40,080,000
<b>Total</b>	<b>9,058,634</b>	<b>46,203,127</b>	<b>1,905,660</b>	<b>0</b>	<b>57,167,421</b>
<b>Percentage of Total Pounds Diverted</b>	<b>15.85%</b>	<b>80.82%</b>	<b>3.33%</b>		

<sup>7</sup> A *reclaimable materials handler* can be any or all of the following: waste hauler, collector, converter, recycling center, materials recovery center, processor, dealer, broker, exporter, extruder, or importer.

<sup>8</sup> A *recycler* processes waste carpet and creates a saleable (value added) end product.

<sup>9</sup> For further discussion about the low response rate and issues surrounding the validity of the study, see the section on "Survey Assessment."

Table 4 shows the diversion rate for PC carpet for the various management methods (column 3), expressed as a percentage of the total 4.7 billion pounds discarded in 2002. When compared to the diversion rate as set forth in the MOU (column 4), which is 3.8% of total discards, or 177,764,000 pounds, the reported amount falls short of the target by 120,596,579 pounds, or 2.58% of total discards. In other words, for this first year of reporting, the 57,167,421 pounds diverted represents 32.16% of CARE’s landfill diversion goal.

**Table 4: Post-Consumer Waste Carpet Diverted from Landfills in 2002  
Reported and Target Diversion Rates**

	Industry Sector	Reported Diversion Rate <sup>10</sup>	Target Diversion Rate	Differential (Reported-Target Diversion Rate)
Reuse	manufacturers	0.19%	-	
	handlers/recyclers	-		
	total combined	0.19%		
Recycling	manufacturers	0.13%	3.8% <sup>11</sup>	
	handlers/recyclers	0.86%		
	total combined	0.99%		
Waste-to-Energy (WTE)	manufacturers	0.04%	-	
	handlers/recyclers	-		
	total combined	0.04%		
Cement Kilns		-	-	
<b>Subtotals</b>	<b>manufacturers</b>	<b>0.36%</b>	<b>3.8%</b>	
	<b>handlers/recyclers</b>	<b>0.86%</b>		
<b>Total Combined (manufacturers and handlers/recyclers)</b>		<b>1.22%</b>	<b>3.8%</b>	<b>-2.58%</b>

## Recycling

Recycling was the primary diversion strategy used by manufacturers and handlers/recyclers who participated in the CARE survey, followed by reuse and WTE. None of the diverted carpet waste was used as components in cement mix or for energy in cement kilns. Of the 46+ million pounds of PC carpet recycled during 2002, manufacturers accounted for 13.3% while handlers/recyclers contributed 86.7% to the recycling effort (Table 3). Of the four landfill diversion strategies, recycling was the only method employed by handlers/recyclers.

<sup>10</sup> Based on total discard amount of 4,678,000,000 pounds of PC carpet waste in 2002.

<sup>11</sup> Represents 177,764,000 pounds.

## Reuse

Manufacturers accounted for 100% of the 9,058,634 pounds of carpet waste diverted from landfills for reuse (Table 3). This usage pattern reflects the efforts of some manufacturers to promote reusability and environmental sustainability of their product.

## Waste-to-Energy (WTE)

Data provided by participants in this study indicated that 1,905,660 pounds of carpet waste (only 3.33% of the total diverted from landfills) was used for WTE. Again, manufacturers were responsible for 100% of the diversion in this waste category.

## Cement Kilns

For 2002 there was no reported use of cement kilns as a method to manage waste carpet. However, there are ongoing efforts to improve the mechanics of using carpet as an alternate fuel for cement kilns. Emissions data from trial burns at the EPA test kiln in Research Triangle Park, NC, demonstrate that carpet as an alternative, clean fuel source is a viable concept. CARE continues to work with the cement industry to find the best ways to feed carpet into the kiln, and has partnered with the American Society of Chemical Engineers to aide in this research. During 2003, CARE plans to conduct a proof of principle at a large scale cement kiln at a facility to be determined. Once this test is completed, CARE will be able to focus on the economics of cement kilns to determine the viability of this management option.

## Carpet and Fiber Manufacturers

Reuse accounted for the majority of the PC waste carpet handled by manufacturers; another 35.8% went toward recycling and 11.2% to WTE (Table 5). Manufacturers did not report sending any PC carpet waste to landfills. In all cases, fiber content of the recovered carpet was either unknown or unreported. The PC carpet diverted by manufacturers may represent some of the poundage associated with “take-back” programs.

**Table 5: Post-Consumer Waste Carpet Diverted from Landfills by Carpet and Fiber Manufacturers in 2002 (in pounds)**

Primary Fiber	Reuse	Recycling	Waste-to-Energy	Cement Kilns	Landfill	Total
nylon 6	0	0	0	0	0	0
nylon 6,6	0	0	0	0	0	0
PP	0	0	0	0	0	0
PET	0	0	0	0	0	0
wool	0	0	0	0	0	0
other	9,058,634	6,123,127	1,905,660	0	0	17,087,421
<b>Total</b>	<b>9,058,634</b>	<b>6,123,127</b>	<b>1,905,660</b>	<b>0</b>	<b>0</b>	<b>17,087,421</b>
<b>Percentage of Total Pounds Diverted</b>	<b>53.01%</b>	<b>35.83%</b>	<b>11.15%</b>			

## Waste Handlers and Recyclers

Recycling was the only method employed by handlers/recyclers to manage PC carpet (Table 6). None was used for reuse, WTE, or cement kilns, nor was any sent to landfills. The fiber content for the majority of the waste carpet processed by handlers/recyclers was not identified; of the 2.7% identified, 0.3% was nylon 6 and 2.4% was nylon 6,6. Handlers/recyclers reported collecting their waste carpet from manufacturers and construction and demolition sites.

**Table 6: Post-Consumer Waste Carpet Diverted from Landfills by Waste Handlers/Recyclers in 2002 (in pounds)**

Primary Fiber	Reuse	Recycling	Waste-to-Energy	Cement Kilns	Landfill
nylon 6	0	120,000	0	0	0
nylon 6,6	0	960,000	0	0	0
PP	0	0	0	0	0
PET	0	0	0	0	0
wool	0	0	0	0	0
other	0	39,000,000	0	0	0
<b>Total</b>	<b>0</b>	<b>40,080,000</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Percentage of Total Pounds Diverted</b>		<b>100%</b>			

## Survey Assessment

The figures presented in this report represent a small fraction of the carpet currently in the national waste stream. The data is based on a low response rate: only 7.6% of manufacturers and 5.9% of handlers/recyclers. Without accounting for several manufacturers and handlers/recyclers, the waste diversion totals in this report must be considered preliminary and conservative.

The amounts reported did reveal that post-industrial/pre-consumer (PI) waste accounted for an overwhelming amount of carpet diverted from landfills.<sup>12</sup> This is not a surprising finding. Furthermore, diversion is heavily weighted toward recycling. When combined with reuse, some 99% of the current landfill diversion of both PC and PI carpet is through recycling or reuse.

The numbers reported for all carpet waste diverted from landfills (both PI and PC) are encouraging. However, for PC carpet, CARE still has some work to do. As Table 4 shows, CARE fell short of the landfill diversion target by 120,596,579 pounds, or 2.58% of total PC waste discards. That CARE only achieved a reported 1.22% diversion rate for PC carpet compared to the target of 3.8% can be attributed to a number of factors which are outlined below.

<sup>12</sup> See Appendix A for an analysis of post-industrial/pre-consumer (PI) waste carpet diverted from landfills.

## Response Rate

Unfortunately, the volunteer response rate to the 2002 CARE survey was disappointing. Despite active and repeated contact with the 237 carpet and fiber manufacturers operating in the continental U.S., only 18 supplied useable data. Handlers and recyclers were even less inclined to participate in the project and of the 85 active handlers/recyclers contacted, only five responded with useable data. Because of the low response rate, data for waste diversion and waste to landfills are vastly underestimated and cannot be compared in a way that would support valid conclusions.

The good news is, underreporting would suggest that there is a lot of diversion not accounted for in this first CARE report. In other words, since the reported numbers represent only a fraction of the landfill diversion that is *actually* occurring (among companies represented in the CARE survey PLUS companies which did not report numbers), the actual rate is likely closer, or might even exceed, the target landfill diversion rate.

Another observation, however, is the possibility for double counting in the survey numbers; i.e., having different companies in the collection network account for the same carpet diverted from landfill. For example, a manufacturer may have reported sending x number of pounds to a recycler, who then reports recycling that same x number of pounds of waste carpet. In this case, both companies would report the same poundage in the “recycling” category, hence doubling the numbers in that part of the final survey tally. For this reason, Table 4 breaks down diversion rates by manufacturers and handlers/recyclers.

Given the low survey response rate, even if double counting occurred, it is perhaps mitigated by the many diverted pounds of waste carpet *not* accounted for among the majority of companies who never reported. Also, some survey recipients may have already factored into their decision-making the likelihood of double counting, and took measures to avoid it. Indeed, one company decided against completing the survey because its numbers had already been accounted for in another company’s survey.

## Survey Challenges

Considerable effort and time were devoted to developing online surveys with the intent of optimizing privacy and convenience for the survey responders. Few companies chose to respond electronically to the CARE survey. Even fewer responded by FAX or mail. Communicating with companies via telephone created a lot of promises to participate, but only a slow trickle of responses. Contacting companies directly is time-consuming and ineffective, as many phone systems now utilize automated menus and voicemail, avenues which may or may not generate a meaningful response.

Many manufacturers and handlers/recyclers are still computer phobic. Electronic responses frequently were incomplete and omitted production data or answers to questions such as “Method used to identify fiber content?” and “Were you aware of the CARE initiative before receiving this survey?” Such deficiencies will be corrected in future online surveys.

Small manufacturers and recyclers/handlers are more difficult to survey than larger companies. Small-scale businesses frequently are unable or unwilling to devote manpower to record keeping and/or monitoring the amounts and types of waste they transport, reuse, or recycle. Unless mandated by law, many manufacturers and recyclers/handlers (both large and small), are not interested in participating in a CARE survey. Occasionally this information is viewed as proprietary and small companies do not wish to reveal this information for competitive reasons. Twice in the past seven years, UGA included carpet manufacturers in surveys of waste generation and disposal. The first survey in 1996 resulted in no response and the second in 1997 had only one response. Although the response rate and data from the 2002 CARE survey are poor, they actually show an improvement in participation from carpet manufacturers.

### **CARE-Specific Survey Challenges – The Problem of Demand**

Compounding basic survey challenges are the complexities inherent in the waste carpet recovery process. Many of the problems with the CARE survey stem from the widely-held misperception that waste carpet is not valuable; therefore, many companies are not paying attention to it. At this early stage in CARE's ten-year landfill diversion schedule, the need to raise awareness about the economic viability of waste carpet, and the attendant efforts to support entrepreneurs who create marketable products out of waste carpet, has become increasingly apparent.

The current weak demand for waste carpet has many implications. One symptom is a weak collection infrastructure, which served as a constraint in collecting meaningful data in the 2002 CARE survey. Many companies that collect and transport PC carpet are small independents in which carpet is only a part of their operation. These companies do not have the resources or incentives to monitor the amount of PC carpet that is collected or track how much is added to or diverted from landfills. Frequently, carpet is not separated from primary waste streams at waste collection centers because it has no perceived value for recycling or resale. However, as CARE develops and promotes markets for reusable carpet and products from recycled carpet, an incentive to monitor this data will develop. Once there is sufficient demand for recycled and reused carpet, the collection system will follow. Right now, unfortunately, the collection system is simply a reflection of the fledgling market for products made from recycled and reused waste carpet.

Without a robust collection infrastructure, other logistical problems are apparent. The process of identifying and quantifying waste carpet fiber, for example, is not straightforward. Today, many companies lack a reliable, systematic method to report and evaluate quantities processed. A major obstacle for small companies is the inability to generate truckload quantities of waste in a short period of time. Many haulers are reluctant to leave trailers at drop-off locations for extended periods of time. Manufacturers also may not have space to devote to a recycling trailer. Distance to recyclers is problematic if transportation time and cost are less economically competitive than using landfills. Lastly, manufacturers may not be aware of handlers/recyclers in the area, and are still learning about their presence and location.

## **Impact of Market Conditions**

The economic downturn also has dampened consumers' interest and demand for recycled products. As Evergreen Nylon Recycling, llc (joint venture between Honeywell and DSM) learned with its plant in Augusta, Georgia, if you build it, the carpet will come. However, the plant experienced technical difficulties, and demand for the end product was insufficient to keep the system functioning.

Changes in the national economy were felt in both the carpet and reclaimable materials handling/recycling industries. Mailing lists need continual revision as ownerships change and businesses move or close. Of the 322 CARE surveys sent to manufacturers, 71 or 22% were inactive or inappropriate. Of the 161 surveys sent to handlers/recyclers, 76 or 47.2% no longer recycle carpet. The precarious nature of the recycling business was especially pronounced during the recent economic downturn. This problem adversely affected response rates.

Consumer interest in recycled content, (when it costs more), declined with the general belt-tightening (based on previous waste generation data and direct conversations with waste generators and handlers/recyclers). The demise of the Evergreen Nylon Recycling plant in August of 2001 seriously impacted a small handler who had recently switched from collecting cardboard to collecting PC carpet. Several other handlers/recyclers also were victims of a congested pipeline whose main outlet suddenly closed. The key lesson is that you cannot turn collection systems on and off like a faucet. To stay solvent, some handlers/recyclers reported wanting to charge manufacturers for disposal service.

Handlers/recyclers currently are facing strong competition from the landfill industry because dumping restrictions and tipping fees have decreased in some states. One recycler reported a loss of demand for recycled carpet padding because of cost considerations. Some commercial customers have chosen the less costly direct glue-down installation, which does not utilize padding. The continuing challenge in the current economic recession is to create end products with recycled content that are commercially competitive with a large enough market to utilize the amount of PC carpet generated.

## **Rugs**

One last factor hampering the data collection effort was rug manufacturers, who generally do not consider themselves part of the mainstream carpet industry and therefore resist supplying waste generation and disposal data. However, some also do not generate significant amounts of waste because they make to size, so their impact on the final tally of pounds diverted from landfills would be minimal.

## **Lessons Learned**

This first year of collecting data about the amount of waste carpet diverted from landfills has been a learning experience. Based on the low response rate, efforts to improve future surveys should include more input from the proposed recipients as to what data they are willing and able to supply and what types of incentives might encourage participation. Also, as already

mentioned, the survey requires improvement to avoid the double counting loophole, whereby the same quantity of carpet is counted more than once, by multiple parties.

Furthermore, the survey will need to include input from more players in the collection infrastructure. To obtain more meaningful data about disposal and diversion of PC carpet, it is recommended that CARE contact companies that are in closer proximity to the generation of this waste stream. This group would include distributors, retailers and installers of carpet as well as contractors and construction/demolition companies who remove and dispose of PC carpet. Information from these groups could provide more meaningful data necessary to assess progress toward the national goals for carpet recovery.

Compiling contact information for these industry segments is possible, but would require a concerted effort and long-term commitment. Many of the trade organizations and professional associations contacted during the first year of this project maintain lists of their members and their position in the supply/demand chain. From previous contacts with managers of these databases, most are very interested in CARE and how it can benefit their members. Ongoing research related to development of a collection infrastructure for PC carpet also can provide information on industry groups closer to generation of the PC carpet waste stream.

CARE can be of service to the small manufacturer and handler/recycler by promoting waste diversion, providing economic incentives for diversion, and improving networking among waste generators and handlers/recyclers. The CARE/UGA Recycling Resource ([www.fcs.uga.edu/recyclecarpet](http://www.fcs.uga.edu/recyclecarpet)), maintained at UGA, is designed to meet some of these goals. Although waste collected by a single tufting subcontractor may not amount to very much, when the efforts of 300 other manufacturers are combined, the magnitude of the waste is significant, especially to a small local landfill.

## **Survey of Government Agencies**

In addition to manufacturers, handlers and recyclers, UGA surveyed the US Environmental Protection Agency (EPA) and state waste management agencies. The EPA was polled electronically by email, and the state agencies were polled by direct mail. UGA followed up with all agencies using email and fax. Of the 11 EPA offices contacted (headquarters plus ten regions), six or 55% of these responded to the 2002 CARE survey. Of the 50 state agencies contacted, 23 states, or 46%, responded. Of the ten states which originally signed the MOU, six completed the CARE survey.

In general, lack of funding rather than lack of interest influenced government outreach efforts, and eliminated or limited programs that could have promoted or facilitated the diversion of waste carpet from landfills. Some states and EPA regions do utilize the CARE web site and refer manufacturers and handler/recyclers to this resource. Several new links will be added to the CARE/UGA Recycling Resource database and the CARE web site as a result of contact with the states and EPA.

Some state and EPA respondents expressed frustration that “nothing” was being done at their location because of lack of funding and no incentives or concrete guidelines for contracts. For

example, “If EPA, the carpet industry, or a third party develops recycled-content guidelines for carpet, [this state] would again consider adding recycled-content carpet to its list of preferred products,” and “Although we are aware that there are nylon products (other than carpet) made from reclaimed nylon fiber from carpets, there is limited information on the other products made from recycled carpet fiber and their specifications to establish procurement guidelines for state contracts.” CARE can be of service by disseminating this information to state and federal agencies.

Survey questions sent to the states, along with the answers from the 23 respondents, are summarized below.

*Are you maintaining a web site that publicizes collection options in your state?*

Eleven states reported “yes” and nine “no.” One state reported two unsuccessful attempts to get federal funding from EPA for this purpose.

*Are you facilitating applications for incineration permits?*

Sixteen states reported “no,” one “yes” (but no applications were submitted), one “yes and no” (WTE only) and one reported receiving no applications but 2 WTE facilities exist.

*Are you encouraging the use of products made from recycled carpet in state contracts? If so, how much is post-industrial? How much is post-consumer?*

Eleven states reported “yes” and seven “no.” By statute, one state requires that “50% by cost [be] recycled content (>50% recycled, >10% post-consumer).” Another state reported encouraging the use of recycled content in carpet, but not for “other products using recycled carpet content.” A third state reported that the “current specs do not differentiate between PC & PI.”

*Are you identifying and facilitating small business development in carpet recycling or reuse? How?*

Seven states reported “yes” and 12 “no.” The methods cited for supporting small business were financial (through low-interest loans, grants, and other funding mechanisms), as well as technical assistance and informational updates.

*Do the counties/cities in your state have special collection days for carpet? If so, how much do they collect, on average?*

Two states reported “yes,” although they send the carpet to landfills. Nine states reported “no” and nine others reported “don’t know.”

*Other carpet-related initiatives or relevant information?*

One state reported working with other states to develop a “Regional Carpet Recovery Strategy during 2003.” Other states reported “[requiring that] all carpet removed in renovations be diverted from landfills,” promoting the inclusion of carpet in construction and demolition debris recycling, and active participation in CARE activities and other recycling endeavors.

Survey questions sent to the US EPA, along with the responses from six offices, are summarized below.

*Are you maintaining a web site that publicizes collection options?*

Three agencies reported “no” and one “yes.” Of the other two agencies, one reported that collection options will be added to its regular web site, and the other reported that “our Regional Solid Waste web page links to CARE.”

*Are you encouraging the use of products made from recycled carpet in federal contracts? If so, how much is post-industrial? How much is post-consumer?*

Three agencies reported “no” and one “yes.” The other two agencies reported they expect this change in federal contracts in 2003.

*Are you facilitating small business development in carpet recycling or reuse? How?*

Five agencies reported “no” (one citing budget constraints) and one reported “yes.”

*How many inquiries does your EPA region receive from the public regarding carpet recycling? What is the nature of the inquiries (what do people want to know), and how does the EPA respond?*

One agency reported receiving no inquiries. Three other agencies reported as follows:

- “Small but consistent, requesting info on where to send spent carpets”
- “Not many, referred to local or county recycling coordinator or to EPA web site”
- “<15 where carpet can be recycled? Refer to CARE’s web site”

*How much (if any) money has your EPA region spent on carpet recycling outreach/initiatives through grants and/or other means?*

Five agencies reported zero dollars and one reported, “\$30,000-\$50,000, supporting travel for stakeholder meetings, financing facilitation, outreach, program support for CARE.”

*Other carpet-related initiatives or relevant information?*

Two of the four comments received indicated that there is no work being done on carpet projects. The other two comments were: “States are hesitant since Evergreen stopped” and “Working with GSA to recycle carpet currently in place. Provided them a list of recyclers 2003: 275,000 sq. ft. of carpet will be recycled by C & A.”

## **CARE Accomplishments During Its First Year**

While manufacturers, handlers, recyclers, and state and federal government agencies have had various levels of involvement in diverting waste carpet from landfills in 2002, the CARE organization was very actively engaged on several fronts. The year 2002 was a year for getting organized and setting up an operational structure for CARE. CARE was registered as a 501(c)3 non-profit organization and established a Board of Directors as required by law. The Board of Directors is made up of the Chairman, along with a representative from the states and one from the federal EPA, the Chairman of the Budget committee, and the co-chairs of each of the committees listed below.

### **CARE Committees**

During its first year, CARE established four primary committees to meet the demands of the organization's overall objectives. Each committee is guided by a mission statement, and is led by two co-chairs.

- ❖ **Business Development Committee**  
Mission Statement: Serve as a resource for entrepreneurs by identifying and facilitating small business development opportunities, including: financing, business plan development and other business tools.  
Committee Co-Chairs:
  - Paul Ashman, President, Environmental Recovery Consolidation Services
  - Matthew Ewadinger, Manager, North Carolina Recycling Business Assistance Center
  
- ❖ **Recovery Committee**  
Mission Statement: Facilitate the development of a nationwide infrastructure to help recover carpet at the rate set in the MOU.  
Committee Co-Chairs:
  - Edward Duffy, Technology Leader, Honeywell Inc.
  - Seshadri "Ram" Ramachandran, Reclamation Business Manager, DuPont Flooring Systems Inc.
  
- ❖ **Product Development Committee**  
Mission Statement: Facilitate the rapid development of emerging product concepts by actively working with Entrepreneurs, Carpet Industry Partners, Private Enterprise, and Academia. Through lowering of barriers for development scattered among diverse groups, integration of new products into the marketplace will take place in accordance with the goals of CARE for landfill diversion by 2012.  
Committee Co-Chairs:
  - Dobbin Callahan, General Manager, Government Markets, Collins & Aikman Floorcoverings Inc.
  - Frank Endrenyi, VP, Strategic Product Planning, Mohawk Group Inc.

❖ **Market Development Committee**

Mission Statement: Facilitate and accelerate the development of markets for products made with recovered carpet materials by providing accurate and timely information, education, and contacts so that CARE achieves the negotiated outcomes of the MOU.

Committee Co-Chairs:

- John Bradford, VP, Manufacturing and Operations, Interface Flooring Systems Inc.
- Robert Peoples, Director, Carpet Sustainability and Business Development, Solutia Inc.

During the latter part of the year CARE also formed the Budget Committee, chaired by Steve Bradfield, Vice President of Environmental Market Development, Shaw Industries, to oversee CARE’s financial plan.

**CARE Sponsorship Program**

Of particular note has been CARE’s sponsorship program. During 2002, since CARE became incorporated as a 501(c)3 nonprofit organization, it now solicits contributions from corporations, government agencies and anyone else with a vested interest in diverting carpet from landfills. Each contribution signifies good faith support and a willingness to participate in the process of helping CARE to achieve its objective of 40% landfill diversion by the year 2012. It is through the generosity and commitment of CARE’s financial donors that CARE can award grants to deserving entrepreneurs at the first annual meeting in April 2003.

**CARE Sponsorship Program<sup>13</sup>**

Sponsorship Level	Contribution Amount	Sponsoring Companies
Corporate	companies < \$1B in carpet sales \$10,000 companies > \$1B in carpet sales \$20,000 state governments \$5,000 nongovernmental organizations (NGOs) \$2,000 equipment suppliers \$10,000 materials suppliers \$10,000 entrepreneurs in kind all others \$5,000	<ul style="list-style-type: none"> <li>▪ bp Amoco</li> <li>▪ C&amp;A Floorcoverings</li> <li>▪ The Dixie Group</li> <li>▪ Environmental Recovery &amp; Consolidation Services (ERCS)</li> <li>▪ J&amp;J Industries</li> <li>▪ Lees Carpets</li> <li>▪ Mannington Mills</li> <li>▪ Mohawk Industries</li> <li>▪ State of North Carolina</li> <li>▪ Shaw Industries</li> </ul>
Green	150% of the Corporate Sponsor level	<ul style="list-style-type: none"> <li>▪ Solutia</li> </ul>
Sustainability Leadership	200% of the Corporate Sponsor level	<ul style="list-style-type: none"> <li>▪ DuPont Flooring Systems</li> <li>▪ Interface Americas</li> <li>▪ SB Latex Council</li> </ul>

<sup>13</sup> There will be adjustments to CARE contribution levels for 2004.

## **CARE Web Site**

In 2002, CARE launched its web site at [www.carpetrecovery.org](http://www.carpetrecovery.org). The web site serves as a carpet recycling resource, where visitors can find key contacts and learn more about the various aspects of the waste carpet recovery process: collecting and processing used carpet; developing new products made from used carpet; finding markets for recycled content products; and developing carpet recycling businesses. Also included on the site are updates about various CARE activities -- such as the sponsorship program and the annual meeting -- and background information, including a history of the two-year negotiation process leading up to the establishment of the MOU. Visitors can contact CARE through the web site and sign up to receive email updates. CARE will continue to use its web site to report on progress toward the national goals for carpet recovery. The CARE web site is maintained by The Carpet and Rug Institute (CRI), in Dalton, Georgia, with contributions and input from the various CARE committees.

Throughout the year CARE encountered multiple successes. The next section highlights the accomplishments of the Market Development Committee, including several recycling success stories.

## **Market Development Opportunities for Recovered Carpet**

With the much needed emphasis on finding new products and markets for waste carpet, the CARE Market Development Committee (MDC) has been very active during this charter year. Considerable time and energy have been invested in meeting with and understanding the myriad of potential products, technologies, and market outlets, both existing and proposed. Once this level of understanding was achieved, the MDC developed a three-year plan to help enable its mission within CARE: "To facilitate and accelerate the development of markets for products made with recovered carpet materials by providing accurate and timely information, education, and contacts so that CARE achieves the negotiated outcomes of the MOU." The MDC three-year plan may be summarized as follows.

### **Market Development Committee Three-Year Plan**

The success of the CARE Market Development effort is built upon the idea of enabling entrepreneurs in a free enterprise system. The carpet industry does not have all the answers nor do they channel their resources toward the development of new products or services unrelated to their primary business – the manufacture and delivery of high performance, high style carpet and carpet fibers. Therefore, the industry supports the efforts of those who have expertise and experience in the handling of waste streams for which value may be recovered.

The thrust for the Market Development efforts has been divided into four categories. Each category shows appropriate activities in support of the MDC objectives. The activities are not limited to any one category. It is envisioned that everyone must be involved in these activities to ensure success.

## 1. Promotion and marketing of products

- Increase exposure to governmental agencies as well as private sector constituencies who would have an interest in green products
- Use the CARE web site to publish information about companies, their products and services
- Expose entrepreneurial products through conferences, trade shows, and publications
- Maintain an up-to-date list of all carpet-derived products and opportunities
- Work to identify and create new market outlets and product ideas
- Serve as an information/network hub on market applications and opportunities (be a credible source of information)
- Identify and work to overcome any regulatory barriers that limit the use of any materials derived from PC carpet
- Work with regulators to identify creative opportunities to facilitate collection and use of products derived from PC carpet
- Provide educational forums for end users or potential end users
- Participate in state vendor fairs and other meeting forums to disseminate information

## 2. Communication and networking among entrepreneurs and CARE members

- Serve as an information/network hub on market applications and opportunities (be a credible source of information)
- Enable and facilitate networking with entrepreneurs to help them identify market outlets
- Provide guidance on obtaining Environmentally Preferable Purchasing (EPP) certification at the state and federal levels
- Share experiences with one another to help solve problems, improve logistics, and improve cost positions
- Offer guidance on potential outlets, marketing advice, connections to the Business Development Committee
- Develop/advise on marketing materials where appropriate
- Work to identify and create new market outlets and product ideas

## 3. Research and development activities

- Create PC carpet-derived Green Product or Process and Recycler of the Year awards
- Work to identify and create new market outlets and product ideas
- Facilitate in kind support where appropriate for testing and marketing new products
- Review all new products that have been designed or are in development
- Conduct or advise on market research projects
- Facilitate test marketing
- Work to identify and create new market outlets and product ideas
- Work closely with the CARE Product Development Committee

#### 4. Financial assistance through the CARE grant program and other means

- Work closely with the CARE Business Development Committee
- Participate in the CARE grant award program to enable market development for new products
- Facilitate access to state market development and recycling resources

#### Progress in 2002

Progress in 2002 can be summarized as very good. However, the MDC's primary challenge is the public disclosure of information, products and programs versus the pursuit of proprietary programs driven by marketplace competition, which by their nature, remain confidential. There have been many opportunities for new products and uses derived from PC carpet. A few are already in commercial operation:



Synthetic fiber cushion from Los Angeles Fiber Company

- PC synthetic carpet cushion from Los Angeles Fiber Company
- GeoHay®, Inlet Filters, and Infiltrator® products from Champion Polymer
- composite construction sheeting materials like Ny-Board®, Ny-Core®, and Ny-Mat® from Nylon board Manufacturing
- plastic auto parts for under hood applications from Wellman and DuPont
- SelecTile® made from vinyl backed tiles, manufactured by SelecTech

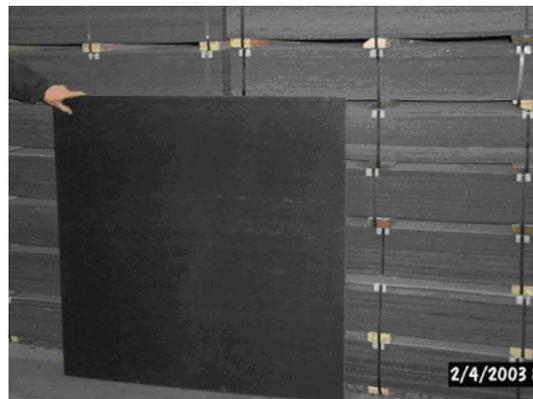
Others products are in the development stage:



GeoHay™, a sediment and erosion control product made from PC and PI carpet

- composite railroad ties
- roofing materials
- unique construction materials
- wood plastic composite
- highway offset blocks
- flood protection bags
- use of PC carpet in cement kilns for energy
- raw materials recovery
- use of material for creative applications like Hummer Grasstiles™

Still other ideas are working their way through the evaluation process and include roofing tiles, conversion of mixed carpet fibers into fuels like syngas, low sulfur diesel fuel, marine timbers, and



Ny-Board™ by Nylon Board Manufacturing

many more ideas which are of a proprietary nature at this time.

Many of the mills and fiber producers have their own green products and programs containing various recycled materials:

- EcoSolutionQ® and EcoWorks® from Shaw
- Ultron® Renew fiber from Solutia
- Earth Squares by Milliken
- modular floor tiles from Interface containing recycled content face fiber and GlasBac® backing
- Dupont's Reclamation program including EPP certification
- Mohawk's ColorStrand™ nylon made with Infinity™ Forever Renewable Nylon, containing 25% PC and 25% PI content
- J&J Industries Encore® SD Ultima®
- C&A Floorcoverings Powerbond RS with 100% recycled-content ER3 backing

The list of products and programs is large and growing. This short summary is not meant to be inclusive. For in-depth information, please visit the CARE web site at [www.carpetrecovery.org](http://www.carpetrecovery.org) or any of the other company web sites.



Future application - Composite railroad ties

CARE has maintained an open dialog with the German Polyamid 2000 plant and owners along with the German recycle group under GUT. Polyamid 2000 has an on-going integrated facility that accepts PC carpet – some of it shipped from the United States – which is processed through a highly automated identification and separation system. From there nylon 6 is depolymerized back to caprolactam which is purified then re-polymerized. Nylon 6,6 is mechanically separated and compounded for black molding applications. Non-polyamid carpets or

pieces of less than one square meter in size are chopped and sent to an onsite WTE facility which generates high pressure steam to drive turbines which produce electricity. The low pressure steam is then directed back to the plant to support operations. The Polyamid 2000 organization is actively investigating plans for an east coast collection center and eventually a processing and recovery plant in the United States.

The key to success is the creation of value added products for which there is a large volume outlet. Without such market outlets, the use of PC carpet and landfill diversion is simply a dream.

All of this work requires money and support. The Market Development Committee has been working to create a grant process for CARE. A grant process was defined based on both an

annual request for proposals (RFPS process) as well as an unsolicited component for smaller grants that may be submitted at any time outside the annual grant cycle. CARE will announce the first grant awards in April 2003 at the First Annual CARE Conference in Sandestin, Florida. Money to support these grants and other CARE activities came from CARE's first solicitation campaign. Designed to expand awareness and garner support for CARE activities, the first campaign was reasonably successful, raising almost \$150,000.



Hummer Grasstiles™

CARE also collaborated with the Public Broadcasting System (PBS) in late 2002 to produce a segment for the documentary series, *The American Environmental Review*. The program will be seen by an estimated 48 million viewers in the spring of 2003 and will help to tell the story of CARE. A corporate version of this tape will be used for education purposes and promotion of CARE.

With over 4.5 billion pounds of carpet going to the landfill each year, the 40% diversion target equates to 1.8 billion pounds in today's terms. It is clear this much diverted PC material cannot all go back into carpet. The mills and fiber producers are making good progress on carpet products, which contain PI and PC content. Therefore, the Market Development Committee will continue to focus most of their energies on non-carpet products containing PC carpet content and working with entrepreneurs to help them be successful.

An example of how CARE can make a significant impact is the use of PC carpet in the production of synthetic carpet cushion. Currently, scrap foam is being imported from Europe and Asia to make carpet foam cushion. The substitution of a fully equivalent synthetic fiber cushion made from PC carpet would allow CARE to achieve over 80% of its targeted diversion goal. This figure is based on the following considerations:

- Synthetic carpet cushion has the same feel as high density foam rebond pad. Berber carpet, which is a heavy loop carpet product, performs best with a high density pad, (either foam or synthetic fiber).
- Assume 2002 sales of carpet equals 1.8 billion square yards with approximately 70% residential, of which 30% is Berber carpet. This equates to 378 million square yards of Berber carpet.
- If synthetic carpet cushion pad is installed under all the Berber carpet, 1.51 billion pounds of PC carpet waste can be used (i.e., 378 million square yards at an average of four pounds per square yard).
- By making the switch to synthetic cushion under just one segment of the market CARE can achieve over 80% of the 2003 goal as rapidly as the switch can be made.

This market opportunity is something that can be done today, and would create U.S. jobs by recycling domestic waste rather than importing waste from other countries. In an analogous fashion, the specification and use of other products made from PC carpet such as GeoHay, Ny-

Board(tm) and various carpet products will begin to add up, help create the infrastructure and the economic base for a whole new American industry, which is also good for the environment.

## **CARE in 2003**

CARE's focus for the coming year will be to continue locating and supporting entrepreneurs who serve as the underpinning of a carpet recycling market. Marketing continues to be the primary objective, followed closely by the establishment of a viable, dynamic, and robust collection system. Toward this endeavor CARE hopes to work with Evergreen Nylon Recycling to find ways to expand the use of their carpet identification/sortation (CarPID<sup>tm</sup>s) program. During 2003, CARE will determine if the timing and funding is right to put in place an Executive Director to take over the day-to-day activities of the organization. CARE has established a budget that includes an Executive Director but a key component will be the generation of funds, which will allow CARE to continue to provide grants to entrepreneurs and engage a paid staff. CARE's sponsorship program has been a pleasant surprise thus far. The expansion of the sponsorship program will be a key to financial success in 2003, when CARE plans to double the amount of dollars available for grants.

If only a few of the numerous projects currently in the works come to fruition in 2003, CARE will advance even more rapidly toward the goal of 40% landfill diversion. CARE's priority will be to facilitate bringing these initiatives to the forefront and the market place.

## **Conclusion**

The first year of CARE has been a great success. The Board of Directors has worked tirelessly and the results of the efforts are evident. CARE made substantial progress toward the landfill diversion target for the first year, and is a viable, on-going organization that has been incorporated as a 501(c)3 and is financially stable thanks to the generosity of its sponsors. The members of CARE are excited about being able to award grants in 2003, something no one believed was possible when CARE was created. The organization's biggest challenge remains in finding outlets for products made from recycled carpet. The next biggest challenge will be to make sure CARE expands its funding base so the organization can continue to move forward toward the national goals for carpet recovery.

The members of CARE look forward to the future, anticipating even greater successes and the hope that CARE will reach its goal of 40% landfill diversion even before 2012.



## Appendix A: Post-Industrial/Pre-Consumer Waste Carpet

CARE is primarily concerned about the handling of PC carpet. However, UGA also gathered data about post-industrial/pre-consumer (PI) waste carpet. Companies reported diverting over 332 million pounds of PI waste carpet from landfill (Table A1). The majority of this material was recycled, 13.1% was reused and a fraction went to WTE.

The recycling of PI carpet was divided roughly in half between manufacturers (51.7%) and handlers/recyclers (48.3%) (Table A1). While handlers/recyclers accounted for more of the reuse (57.66%) than manufacturers (42.34%), manufacturers accounted for all of the diversion to WTE.

One confounder in this data is the pounds reported under PI reuse. The definition of reuse, as provided to the survey participants (see page 4), is: “using a material, product or component of the waste stream in its original form more than once.” The MOU defines reuse as: “The reuse of recovered carpet in a manner that retains the original purpose and performance characteristics of the carpet.” The MOU further explains that “the term recovered means waste material and byproducts which have been recovered or diverted from solid waste, but the term does not include those materials and byproducts generated from and normally reused within an original manufacturing process.” (See page 3 of the MOU for a complete list of definitions.)

In retrospect, the definition provided to survey participants was vague, thereby leaving room for misinterpretation. It is possible that much of the PI poundage reported under “reuse” actually belongs in the “recycling” category since, technically-speaking, reuse only applies to PC waste materials (i.e., carpet that was previously shipped out of the manufacturing facility and has been returned to a manufacturer or handler/recycler after use by a consumer, to be refurbished in its original form).

In light of the distinction between these two definitions, CARE needs to clarify the definitions for the next round of surveys, to ensure accurate reporting of reuse versus recycling of PI carpet waste.

**Table A1: Post-Industrial/Pre-Consumer Waste Carpet Diverted from Landfills in 2002 Reported by Carpet and Fiber Manufacturers, Waste Handlers and Recyclers in the 2002 CARE Survey (in pounds)**

	Reuse	Recycle	Waste-to Energy	Cement Kilns	Total
Manufacturers	18,477,776	148,328,238	2,198,615	0	169,004,629
Handlers/ Recyclers	25,168,000	138,620,400	0	0	163,788,400
<b>Total</b>	<b>43,645,776</b>	<b>286,948,638</b>	<b>2,198,615</b>	<b>0</b>	<b>332,793,029</b>
<b>Percentage of Total Pounds Diverted</b>	<b>13.12%</b>	<b>86.22%</b>	<b>0.66%</b>		

## Carpet and Fiber Manufacturers

Manufacturers predominantly used recycling methods to handle PI waste carpet, followed by 10.9% for reuse and 1.3% for WTE (Table A2). The recycled fiber content was largely unidentified (94.5%); of the known fiber content, 3.4% was nylon 6,6 and 1.9% was nylon 6. When PI carpet waste was discarded in landfills, 99.2% was unidentified followed by fractional percentages of the other generic types.

Of the contract tufters surveyed, 15.8% return waste with the finished product. Whether or not PI carpet waste goes into a dumpster (21%) or is diverted to a recycler (63.2%) seems to depend on: 1) if the quantity is deemed sufficient to attract a recycler, 2) if the effort to divert waste from the dumpster is economically attractive, and 3) if the manufacturer knows who the local recyclers are and how to contact them.

**Table A2: Post-Industrial/Pre-Consumer Waste Carpet Diverted from Landfills by Carpet and Fiber Manufacturers in 2002 (in pounds)**

Primary Fiber	Reuse	Recycling	Waste-to-Energy	Cement Kilns	Landfill
nylon 6	0	2,882,474	0	0	283,770
nylon 6,6	0	5,039,830	0	0	118,290
PP	15,319	132,747	0	0	46,006
PET	0	58,047	0	0	2,050
wool	0	1,547	0	0	50
other	18,462,457	140,213,593	2,198,615	0	59,443,704
<b>Total</b>	<b>18,477,776</b>	<b>148,328,238</b>	<b>2,198,615</b>	<b>0</b>	<b>59,893,870</b>
<b>Percentage of Total Pounds Diverted</b>	<b>10.93%</b>	<b>87.77%</b>	<b>1.30%</b>		

## Waste Handlers and Recyclers

The five handlers/recyclers that participated in the CARE survey reported disposing of their PI carpet waste through recycling and reuse (Table A3). These companies sent no carpet waste (either PI or PC) to landfills.

The fiber content for the majority of the PI waste carpet processed by handlers/recyclers was not identified. Of the remaining materials, 19.7% was identified as polypropylene, 17.9% as nylon 6, 10% as nylon 6,6, 0.5% as PET and 0.1% as wool.

**Table A3: Post-Industrial/Pre-Consumer Waste Carpet Diverted from Landfills by Waste Handlers/Recyclers in 2002 (in pounds)**

Primary Fiber	Reuse	Recycling	Waste-to-Energy	Cement Kilns	Landfill
nylon 6	0	29,340,400	0	0	0
nylon 6,6	0	16,390,000	0	0	0
PP	6,864,000	25,476,000	0	0	0
PET	0	900,000	0	0	0
wool	0	210,000	0	0	0
other	18,304,000	66,304,000	0	0	0
<b>Total</b>	<b>25,168,000</b>	<b>138,620,400</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Percentage of Total Pounds Diverted</b>	<b>15.37%</b>	<b>84.63%</b>			

## Total Waste Carpet Diverted from Landfills – PC and PI Combined

Nearly 390 million pounds of PC and PI carpet combined was diverted from landfills (Table A4). Of this total, 85.3% was classified as PI and 14.7% PC. Handlers and recyclers accounted for 52.3% of the diverted waste; of this amount, 80.3% was classified as PI and 19.7% PC. Manufacturers accounted for 47.7% of the diverted waste; of this amount, 90.8% was PI and 9.2% PC. Recycling and reuse together accounted for 99% of the total waste carpet diverted from landfill.

**Table A4: PC and PI Waste Carpet Diverted from Landfills in 2002  
Reported by Carpet and Fiber Manufacturers, Waste Handlers and Recyclers  
in the 2002 CARE Survey**

	Waste Category	Pounds Diverted				
		Reuse	Recycle	Waste-to Energy	Cement Kilns	Total
Manufacturers	PI <sup>14</sup>	18,477,776	148,328,238	2,198,615	0	169,004,629
	PC <sup>15</sup>	9,058,634	6,123,127	1,905,660	0	17,087,421
	<b>Total</b>	<b>27,536,410</b>	<b>154,451,365</b>	<b>4,104,275</b>	<b>0</b>	<b>186,092,050</b>
Handlers/ Recyclers	PI	25,168,000	138,620,400	0	0	163,788,400
	PC	0	40,080,000	0	0	40,080,000
	<b>Total</b>	<b>25,168,000</b>	<b>178,700,400</b>	<b>0</b>	<b>0</b>	<b>203,868,400</b>
<b>Total Pounds Diverted</b> (manufacturers and handlers/ recyclers)	<b>PI</b>	<b>43,645,776</b>	<b>286,948,638</b>	<b>2,198,615</b>	<b>0</b>	<b>332,793,029</b>
	<b>PC</b>	<b>9,058,634</b>	<b>46,203,127</b>	<b>1,905,660</b>	<b>0</b>	<b>57,167,421</b>
	<b>Overall Total</b>	<b>52,704,410</b>	<b>333,151,765</b>	<b>4,104,275</b>	<b>0</b>	<b>389,960,450</b>
<b>Percentage of Total Pounds Diverted</b>		<b>13.52%</b>	<b>85.43%</b>	<b>1.05%</b>		

<sup>14</sup> PI = post-industrial/pre-consumer

<sup>15</sup> PC = post-consumer

## **Recycling**

Of the 333,151,765 pounds recycled during 2002, 86.1% was classified as PI and 13.9% as PC (Table A4). Overall, manufacturers accounted for 46.4% of the total carpet waste recycled while handlers/recyclers contributed 53.6% to the recycling effort. Both handlers/recyclers and manufacturers recycled more PI carpet waste (138,620,400 and 148,328,238 pounds, respectively) than PC carpet waste (40,080,000 and 6,123,127 pounds, respectively).

## **Reuse**

Manufacturers and handlers/recyclers reported reusing 52,704,410 pounds of carpet waste (Table A4). Of this total, 82.8% was PI and 17.2% PC. Handlers and recyclers were responsible for 47.8% of this waste whereas manufacturers reused 52.2%. Most of the waste reused by manufacturers (67.1%) was in the form of PI rather than PC content. Handlers/recyclers reused only PI carpet waste, no PC.

Please see the beginning of Appendix A for a qualification of the PI reuse data.

## **Waste-to-Energy (WTE)**

Data provided by participants in this study indicated that 4,104,275 pounds of carpet waste (only 1.75% of the total diverted from landfills) was used for WTE. Manufacturers were responsible for 100% of the diversion in this waste category with both PI and PC waste comprising significant amounts of the total. WTE consumed 53.6% or 2,198,615 pounds of the PI carpet waste as compared to 46.4% or 1,905,660 pounds of PC carpet.

