

# 2012 National Postconsumer Non-Bottle Rigid Plastic Recycling Report

Prepared by Moore Recycling Associates Inc. for the  
American Chemistry Council

March 2014

## Introduction

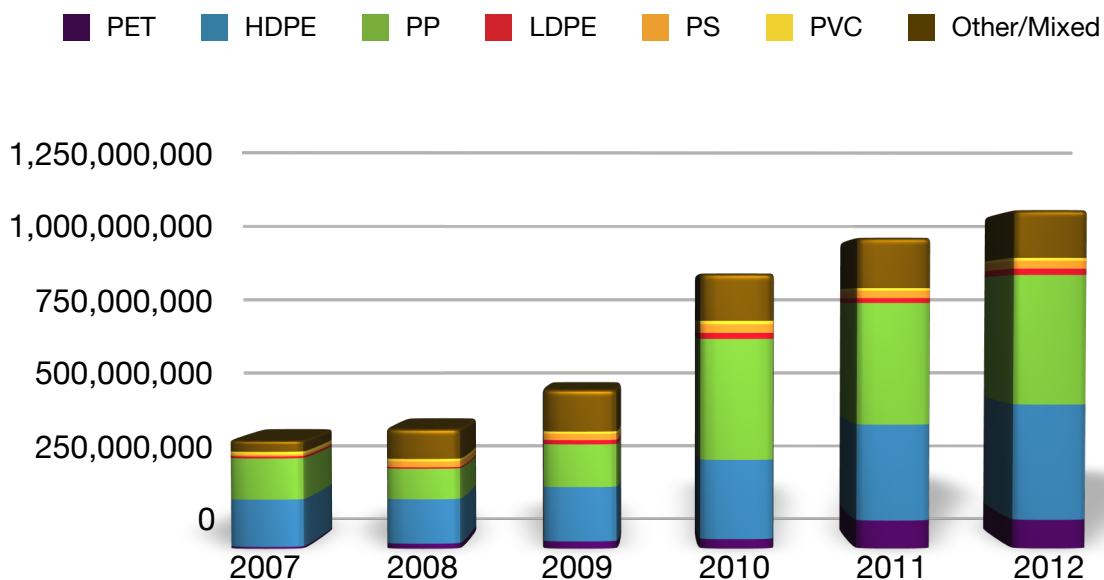
The 2012 National Report on Postconsumer Non-Bottle Rigid Plastic Recycling is the sixth annual report on pounds of postconsumer non-bottle rigid plastics—packaging and non-packaging—recovered for recycling in the United States. Research for this report was conducted by Moore Recycling Associates Inc. for the Plastics Division of the American Chemistry Council.

## Executive Summary

A minimum of 1.016 billion pounds of postconsumer<sup>1</sup> non-bottle rigid plastic was recovered for recycling in 2012. This represents an increase of 10% over 2011. This increase is due to increased non-bottle rigid collection efforts by communities around the country and a handful of new responders to the survey.

Fifty-seven percent of non-bottle rigid plastic scrap was procured by domestic (U.S. and Canadian) users versus exported offshore. Plastic scrap prices and demand were consistent throughout 2012.

### Non-Bottle Rigid Plastic Recovered Year over Year (by Resin)



<sup>1</sup> The EPA defines postconsumer as a material or finished product that has served its intended use and has been diverted or recovered from waste destined for disposal, having completed its life as a consumer item. According to this definition, a business qualifies as a consumer of those goods. This study uses EPA's definition; throughout this report "postconsumer" refers to plastics that have been used for their intended purpose by consumers and by businesses. Commercial materials are often recovered outside of curbside or drop-off collection programs and include items such as totes, pallets, crates, and other commercial packaging. (This report does not cover the recycling of post-industrial materials, which the EPA defines as materials, such as scrap and trimmings, that are generated in manufacturing and converting processes.)

To arrive at an accurate estimate of pounds of non-bottle rigid plastic recovered for recycling in 2012, Moore Recycling surveyed both domestic and export postconsumer markets. This report's findings are based on U.S.-sourced, postconsumer recovery data reported by 24 U.S. and Canadian plastic reclaimers<sup>2</sup> and 33 exporters.

## Methodology

Data on recovered postconsumer non-bottle rigid plastic is collected during the Postconsumer Plastic Recycling Survey, which also gathers data on plastic bottles and film. For this report, the survey gathers data on both mixed rigid plastic and material segregated by resin. The latter is often post-commercial material. Post-commercial material includes products such as packaging for transport—pallets, crates and totes—and material, such as battery casings, collected through special programs.

To prepare the report:

- Moore Recycling continually updates its markets database to include current exporters and reclaimers of plastic scrap;
- Moore conducts an electronic survey of market participants in plastic recycling to collect data; and
- Moore provides a verification step for survey-collected data, checking the accuracy of the data through follow-up calls, conversations with industry contacts, as well as by conducting reviews of other sources of recycling industry information.

### Markets Database

Moore Recycling continually updates an in-house database of plastic exporters, processors, reclaimers and key brokers. Through work with ACC, the Association of Postconsumer Plastics Recyclers (APR), the Plastic Recycling Corporation of California (PRCC) and the National Association for PET Container Resources (NAPCOR), and web sites [PlasticsMarkets.org](http://PlasticsMarkets.org) and [PlasticFilmRecycling.org](http://PlasticFilmRecycling.org), Moore Recycling Associates regularly receives requests from new contacts for material and markets. Moore Recycling also identifies potential buyers through published market databases and conversations with suppliers, such as material recovery facilities (MRFs) and key reclaimers.

### Data Collection and Analysis<sup>3</sup>

Moore Recycling uses a custom-designed web-based survey system to gather data. Although the overall methodology has not changed since the first report, Moore Recycling continually seeks ways to improve the completeness of and timeliness of the survey responses. For example, beginning in 2011, we asked survey participants to differentiate more specifically among

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<sup>2</sup> Moore Recycling surveys and counts material from companies that wash postconsumer material or extrude unwashed material into a clean feedstock or end product.

<sup>3</sup> Moore Recycling conducts the survey and maintains confidentiality of individual responses.

items collected by segregated resin categories (e.g. PET thermoforms, HDPE injection drums, crates, pallets, PP battery casings).

An email with a unique link and message is sent to each contact. After an adequate amount of response time has passed, Moore Recycling staff send follow-up emails and make telephone calls to retrieve data. This follow-up process can take weeks or months depending on responses. Data is entered in the online survey tool, either directly by the company being surveyed, or by Moore Recycling staff when the survey is completed over the phone, by email or fax. As it is received, the data is reviewed for accuracy and follow-up calls are made, as needed. After data collection is complete, the data is compiled and categorized based on the detail reported. The non-bottle portion of the mixed bales reported is determined by applying percentages from a 2011 hand separated mixed-rigid bale-sort project.<sup>4</sup> The final data totals are reviewed, analyzed, and then reported with as much detail as possible without compromising confidentiality. The analysis involves comparison of year-to-year totals, material categories, and buying trends among export and domestic buyers, to determine trends or anomalies that may require further vetting of data. Clearly describing how the data is collected, and what is and is not included in the survey, provides readers of this report with the transparency needed to cross-reference results with other industry data.

### **Survey Categories**

The 2012 survey included the following mixed rigid bales that contain non-bottle rigid plastic:

- All Rigid Plastic - All **bottles**, AND all household non-bottle **containers** (includes thermoform packaging, cups, trays, clamshells, food tubs), AND all **bulky** rigid plastic (includes carts, crates, buckets, baskets, toys, lawn furniture)
- Pre-picked Rigid Plastic - All household non-bottle **containers** (includes thermoform packaging, cups, trays, clamshells, food tubs), AND all **bulky** rigid plastic (includes carts, crates, buckets, baskets, toys, lawn furniture). Very few bottles
- Bottles & Containers - All **bottles**, AND all household non-bottle **containers** (includes thermoform packaging, cups, trays, clamshells, food tubs). Very few bulky items
- Non-bottle Containers - All household non-bottle **containers** (includes thermoform packaging, cups, trays, clamshells, food tubs), with very few bottles and no bulky items
- Bulky Rigid Plastic - All **bulky** rigid plastic (includes carts, crates, buckets, baskets, toys, lawn furniture). No bottles or containers
- Tubs & Lids - PP, PE non-bottle household **containers**, including buckets
- Olefin Bale - PP, PE **bulky** rigid plastic, may include PP, PE bottle and/or non-bottle household containers

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<sup>4</sup> *National Mixed Rigid Plastic Bale Composition Study & Analysis of Non-Bottle Rigid Plastic Available for Recycling*, Association of Postconsumer Plastic Recyclers (APR), 2011

- HDPE Colored Bottles with PP/PE containers
- PP Bale - PP bottles, containers and bulky rigid plastic
- Mixed Resin Clamshell Bale<sup>5</sup>

We also ask for data in these categories:

- Other Mixed Rigid Plastic - a “catch-all” category, defined on a case-by-case basis
- Mixed Post-Commercial Plastic - a “catch-all” category, defined on a case-by-case basis
- Mixed Electronic Scrap - primarily HIPS, ABS, PC
- Post-Commercial or Otherwise Segregated Individual Resins - a list of products that respondents have offered in previous surveys (e.g., PET Thermoforms, HDPE injection [drums-buckets-crates], PP hangers, PVC Flooring, PC CDs)
- Other Plastic - meant for plastic segregated by resin, but other than the specific categories we listed above

NAPCOR conducts a separate survey on domestic PET reclamation and provides Moore Recycling with data for PET non-bottle rigid plastic: thermoforms—both from PET bottle bales and purchased separately—strapping, and cap and label material from the PET bottle reclamation process.

## Background on Collection

Non-bottle rigid plastic is increasingly captured in a variety of ways. Some is collected in specific recycling efforts (e.g., used crates and pallets, e-scrap) and some at the community level. Community programs vary widely from curbside to drop-off, depending on which materials are accepted and how MRFs market their materials. Special programs collect items such as e-scrap and battery casings. Some companies have started community-based non-bottle rigid plastic collection programs for their own products or for specific resins. Each of these programs is described in more detail below.

### Curbside

MRFs generate non-bottle rigid plastic bales in a wide range of types and quality, in part because of the many possible combinations of item types and resins in this broad category, and in part because community programs vary widely in their consumer education and their descriptions of the non-bottle rigid plastics they collect. Most municipalities that collect non-bottle rigid plastics accept household containers, and a growing number are adding bulkier rigid

**In April of 2013, New York City added non-bottle rigid containers and bulky rigid plastic to its curbside collection program, boosting access to specific non-bottle rigid container recycling to 60% of the US population.**

<sup>5</sup> Bale composition data is not available for the Mixed resin Clamshell Bale. Volumes reported under this category go to “Other” resin for this study.

plastics, such as toys, lawn furniture, laundry baskets, and other items.<sup>6</sup> In 2012, many MRFs sorted out the higher value plastic (PET and HDPE bottles) and then baled the remaining rigid plastics together. Others mixed all rigid plastic together. Still others tailored their sorting operations to meet domestic or local market specifications, generally focusing on the olefin (PE and PP) plastics.

### Drop-off and Other Types of Collection

Some communities have drop-off collection programs for all recycling or for specific types of products such as bulky plastic or e-scrap. In the many cities that do not allow electronic products or other specific scrap to be placed in the garbage, drop-off programs provide a designated location for electronics or other plastic to be taken for recycling. Most states require that lead-acid automobile batteries be recycled and not disposed of in a landfill; plastic battery casings make up a significant part of the non-bottle polypropylene recycled every year.

Reclaimers that specialize in processing post-industrial material frequently accept postconsumer material from commercial businesses, because they often generate large quantities of a single resin or product type, and the material tends to be cleaner than that coming from a curbside stream.

**Preserve® and its founding partners (Stonyfield Farm® and Brita®) created the Gimme 5 Program, which places collection bins for polypropylene at retail locations (primarily grocery stores). The Preserve program also accepts polypropylene yogurt cups, Brita® water filters, and other used consumer products and packaging made from polypropylene plastic by mail. In 2012, the Gimme 5 program added Burt's Bees® as a sponsor and collection grew by 36%. Source: <https://www.preserveproducts.com/recycle/programs/171/gimme-5-program>**

Some consumer product manufacturers—often with support from their package manufacturers—have created community programs to recycle their own products or to collect specific resins that have not been contaminated in the curbside stream. These are typically mail-back or drop-off programs. Companies conduct these programs at their own cost as corporate responsibility initiatives and for the supply of raw material.

## Findings

### Volume

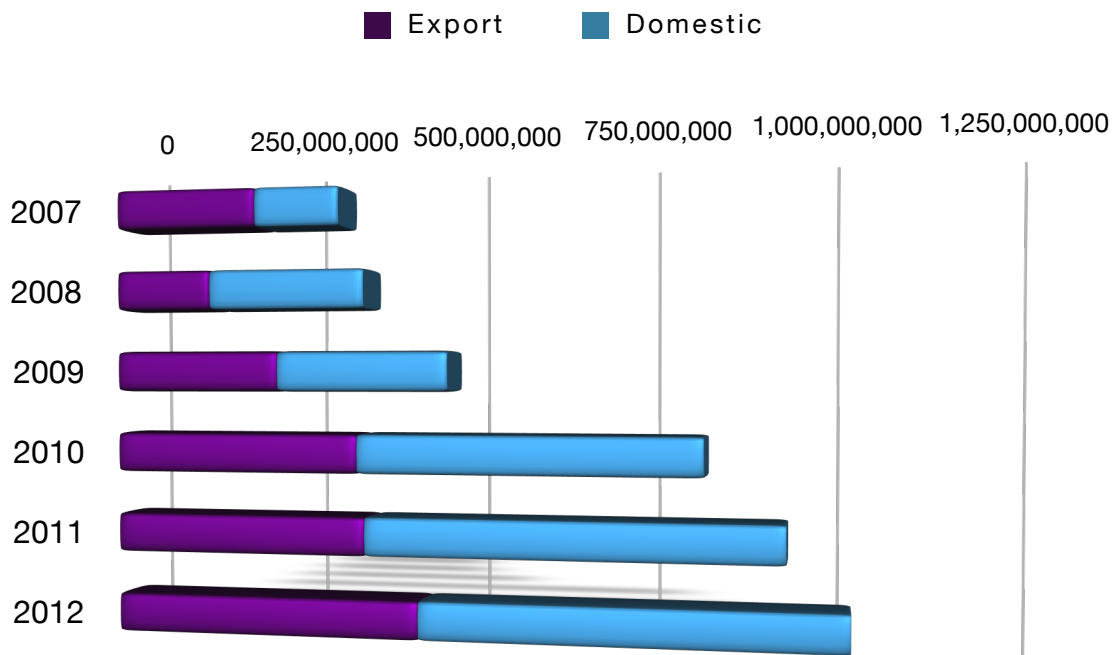
In 2012, the amount of non-bottle rigid plastic reported as recovered in the U.S. for domestic and overseas recycling exceeded 1 billion pounds. Approximately 57% of the 1.016 billion pounds was reclaimed in the U.S. or Canada, and the remainder was exported overseas, primarily to China.

<sup>6</sup> For more information on the increasing number of communities collecting non-bottle rigid plastics, see *Plastic Recycling Collection National Reach Study: 2012 Update*.

**Postconsumer Non-Bottle Rigid Plastic Recovered**

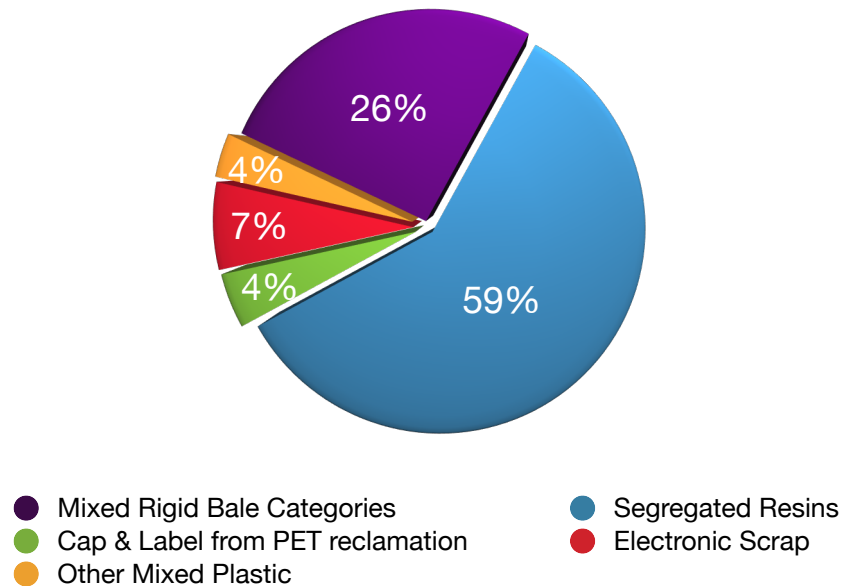
Year	Exported	Purchased for use in United States or Canada	Total
2007	204,040,000	121,400,000	325,440,000
2008	137,132,799	223,642,898	360,775,697
2009	236,104,896	243,115,190	479,220,086
2010	350,869,617	475,783,142	826,652,759
2011	361,527,178	572,400,066	933,927,245
2012	437,207,078	579,451,344	1,016,658,422

**Non Bottle Rigid Plastic - Domestic Versus Export**



The total increase over 2011 in rigid plastic collection was 82 million pounds. The majority of the increase was sold offshore: exports increased by 75 million pounds. The growth in collection in 2012 was due to an increase in mixed resin bales originating from municipal collection programs, and to new responders to the survey reporting segregated resins. Segregated material and mixed resin material from municipal collection programs both grew by 29% in 2012.

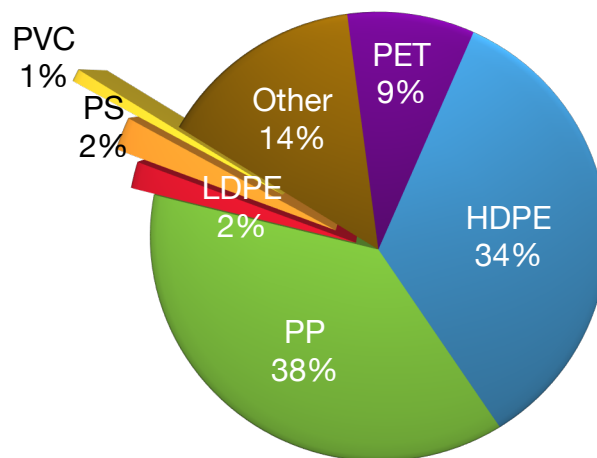
**Sources of Non-Bottle Rigid Material, 2012**



Material reported as segregated resins (e.g., HDPE injection: drums, buckets, crates; PP Battery Casings; PET Thermoforms) made up 59% of the total material reported as recycled. Mixed Rigid Bales, predominantly from municipal programs, made up 26% of the volume reported: primarily from All Rigid, Pre-picked Rigid and Bulky Rigid bales.

**Postconsumer Non-Bottle Rigid Plastic Recovered in 2012 (by resin)**

PET	86,033,835
HDPE	347,323,286
PP	388,790,714
LDPE	18,952,806
PS	23,319,149
PVC	8,808,662
Other Mixed/ Unknown	143,429,970

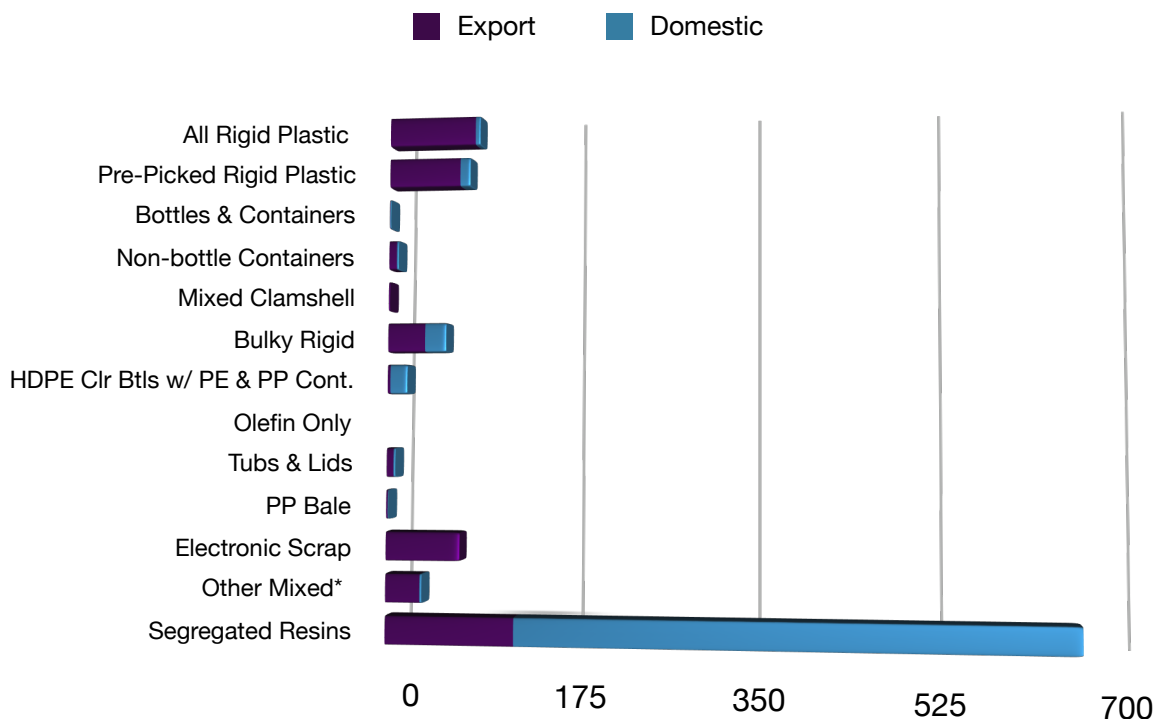


As in previous years, polypropylene was the largest proportion of the non-bottle rigid material recycled, followed more closely than in previous years by HDPE. PP and HDPE together make up the majority of the non-bottle material in mixed rigid bales, and are the majority of reported segregated resin material. HDPE showed the largest increase in 2012, followed by PP. All resin categories, except “Other,” showed at least a slight increase.



The “Other” resin category includes three sources. The first is material reported as “Other Mixed Rigid Plastic” or “Mixed Post Commercial Plastic” without any further information provided on the specific mix of resins. The second source is material reported as a resin other than the six primary postconsumer resins (PET, HDPE, PVC, LDPE, PP, PS), such as polycarbonate or ABS. The third source is the percentage of mixed bales allocated as “other” during the APR-sponsored hand-separated bale sorts. Some resins were beyond the #1-6 Resin Identification Codes, and others were unidentifiable.

**Non-Bottle Rigid Plastic by Source (millions of pounds)**



\*Includes plastic reported as mixed post-commercial

Eighty-one percent, or 521 million pounds, of the resin-segregated plastic was reclaimed in the U.S. or Canada. Eighty-four percent of non-bottle rigid plastics from mixed rigid bales was exported, offshore—primarily to China.

Domestic reclaimers that purchased the remaining 16% of mixed material containing non-olefin plastics reported that they processed both the olefin (PE & PP) and the non-olefin portions.<sup>7</sup>

In one mixed rigid bale category, Bulky Rigid, the domestic market has historically purchased higher volumes than the export market. This was not the case in 2012, when the export market bought 64% of the Bulky Rigid bales reported, compared to only 16% in 2011. This is

<sup>7</sup> The survey asked reclaimers reporting mixed rigid bales whether they used all material, or disposed of, sold or otherwise provided any portion to another reclaimer, exporter, broker or intermediate processor.

consistent with industry feedback that as Bulky Rigid bales became more mixed with non-olefin resins, domestic reclaimers were less interested in this grade and sought out HDPE injection bulky material instead. This trend is confirmed with the increase in the HDPE injection category.

There was a decrease in bales of Bottles & Containers, Tubs & Lids, Non-bottle Containers and Olefin plastic reported in 2012. Alternatively, there was a significant increase in Pre-picked Rigid Plastic bales reported, particularly going export. The volume of All Rigid Plastic bales reported was about the same, although 5% more went overseas.

### **Domestic Capacity and End Markets**

In the U.S. there is at least 801 million pounds<sup>8</sup> per year of non-bottle rigid plastic reclamation capacity, which includes washing or processing unwashed material directly into pellets or end products. Four reclaimers reported either completion or in progress expansions to their reclamation capacities. There is also at least 100 million pounds of non-bottle reclamation capacity in Canada that draws on U.S. and Canadian material. It is important to acknowledge that there is significant grind capacity for plastic scrap that is clean enough to be used unwashed, in both the U.S. and Canada, which is not included in the reclamation capacity reported above. This material is often sold as regrind to manufacturers that use it as they would a washed flake or pellet.

Most of the U.S. capacity is for relatively clean—and often larger—PE and PP items. Many buyers are seeking bulky rigid materials such as buckets, crates, battery casings, storage bins and hangers. A small portion of the domestic capacity is for making mixed-resin products such as lumber, railroad ties, cart wheels, garden products and transport packaging.

The primary domestic end uses for non-bottle rigid plastics are crates, buckets, pipe, automotive products, lawn and garden products and other relatively thick-walled injection products such as drums. As noted, a small portion of the non-bottle rigid plastic collected is used in composite products, such as lumber, pallets and railroad ties. In addition, a number of companies compound these materials and sell to manufacturers that make shapes and forms, or roto-molded products such as tanks, drums and carts. Consumer products like cutting boards, toothbrushes and razors are also manufactured using postconsumer resins.

The survey asked responders to make a historical characterization of supply and demand, 2012 compared to previous years. Although the reported 2012 volumes don't reflect their responses, exporters reported less demand from China and more difficulty exporting material. The Green Fence (discussed in more depth below) did not come into play until early in 2013, but it was mentioned in these responses, and likely influenced comments about 2012. Domestic reclaimers reported general improvements to supply and pricing.

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<sup>8</sup> Capacity for processing non-bottle rigid plastic often overlaps with capacity to process plastic bottles or film. The annual *United States National Postconsumer Plastics Bottle Recycling Report* and the annual *National Postconsumer Plastic Bag & Film Recycling Report* likely report some capacity that is also reported here. Thus, adding the non-bottle rigid, bottle and film capacities from this report and the others could result in some double counting.

**Note:** *The remaining sections of this Report present Discussion and Recommendations reflecting Moore Recycling's expertise and industry knowledge.*

## Discussion

### Supply and Demand

Moore Recycling tracks the non-bottle rigid plastic recycling market throughout the year. Of the five major scrap material categories (plastic, nonferrous, steel, paper, and electronics), plastic scrap has the second highest economic value per ton, nonferrous metals being first. Demand for high-grade material (clean, single resin) is strong because it requires less processing and is therefore less costly to reclaim than dirtier and mixed resin material. Olefin materials (HDPE, PP, LDPE) generally have the highest value in both domestic and export markets because they are relatively easy to process and have a wide range of manufacturing uses. There was interest in developing the capacity to handle small containers, such as cups, deli containers and tubs, which generally require separation and washing before end use but no major investment was made in 2012 because the export market was too strong to justify capital financing. Since 2012, this situation has changed significantly because the Green Fence has opened up the supply of mixed resin bales; we have been informed about some investment in the infrastructure to separate non-bottle plastic for recycling and expect to see more.

Prices for mixed grades of plastic scrap remained fairly consistent throughout 2012, and buyers reported that demand for most grades remained strong and steady.

### Green Fence

In February 2013, China's government began an effort to control scrap imports in an initiative since dubbed the "Green Fence." Since then, nearly all scrap containers imported into China have been opened and inspected. Chinese custom officials are imposing very tight contamination standards. For certain mixed rigid bale commodities—predominantly All Rigid Plastic and Pre-picked—the Green Fence has resulted in a shift from previously strong demand to limited markets in a very short period of time.

### Collection

There are limited but growing domestic markets for the vast majority of the materials collected under an all rigid plastic program, and Moore Recycling is not aware of any communities that have stopped collecting non-bottle rigid plastics because of the Green Fence. If markets do not open up as we foresee, or at a sufficient pace, it is likely that some communities will modify what they accept. If that happens, it is possible we will see a drop in non-bottle rigid collection in 2013 or 2014.

### Separation

The recycling industry is addressing the impact of the Green Fence in a few ways. Initially, some materials recovery facilities (MRFs) and intermediate processors continued to make and store mixed resin bales; others are rerunning the mixed bales and doing additional sorts into categories

that meet China's import requirements and/or have domestic buyers. Unfortunately, not all MRFs are capable of these additional sorts.

There are a few plastic separation facilities (PRFs) that can process mixed resin bales. The PRFs sort the mixed plastic into various resin categories and often "high-grade" the plastic through grinding and, in some cases, washing and pelletizing. The PRF infrastructure is inadequate for the volume of plastic collected in most of the U.S. and Canada; the PRF infrastructure is predominantly located in the Eastern U.S.

## **Future**

Moore Recycling personnel visited China in September 2013 to learn about future plans for the Green Fence. Clearly, U.S. suppliers will not be able to ship low quality or mixed resin bales directly to China in the future. It is likely that some Hong Kong traders and Chinese end users will work with Southeast Asian partners to build infrastructure for sorting and high grading, but this infrastructure is not likely to have the capacity to process all the mixed material that formerly went to China, and because of the additional cost to process offshore, the value of mixed bales will continue to be lower than prior to the Green Fence.

Moore Recycling believes that these restrictions in the Chinese market represent an opportunity to develop domestic infrastructure in North America. Before the Green Fence, potential U.S. buyers could not be assured of a regular quality supply, which—as noted above—restricted investment opportunities.

The Green Fence forced some export buyers out of the market, which has freed up some plastic scrap volume. The remaining buyers can be more particular about the quality of supply they are purchasing. This will accelerate a trend among domestic and export buyers of placing a higher value on material with a higher yield. We expect producers of good-quality material will be rewarded for the extra effort involved, and producers of low-quality material may not be able to move material at all in the future.

## **Recommendations**

### **Depth of demand for non-bottle rigid plastic**

As noted, increasingly MRFs and other plastic scrap processors are expending the necessary resources to create good-quality bales, often single-resin. Research is needed to determine the depth of demand for the types of bales now being created in greater and greater amounts, especially as many communities still want to expand beyond bottles, but need assurance that there will be buyers for their material.

### **Invest in Infrastructure: Sorting, Reclamation, End Markets**

Potential investors in recycling infrastructure need to know that they will have reliable supply, viable technology and demand for the end product. If it wishes to foster such investment, the plastics recycling industry must facilitate documentation of these variables. Funders need independent documentation of supply. Public research and development must be made available

on potential technology and end markets. Lastly, to expand the infrastructure, generators must be willing to create quality bales and enter into bankable supply agreements with reclaimers.

### **Design for Recyclability**

While suitability for use is the primary product and packaging design rule, manufacturers and consumer product companies that want their products and packages to be recycled at end of life, must carefully consider ease of recyclability—including material composition and use of additives, inks and labels—at the design phase. The most respected guidance in the field is APR's Design for Recyclability™ Guidelines. Moore strongly recommends, in its professional judgment, that these Guidelines be consulted and followed to maximize product and package recycling.

### **Additional Information**

The Plastics Division of the American Chemistry Council, which provided funding to Moore Recycling Associates to prepare this report, provides resources to assist communities, businesses and consumers in increasing awareness and education on the recycling of plastic bottles, containers and plastic bags and film. Moore Recycling is a recognized expert in the field of plastics recycling and has been conducting recycling studies for over 25 years. This work has been conducted and evaluated in an objective manner by persons qualified to do so, using procedures generally accepted in the profession to yield accurate and reliable results. For information about recycling non-bottle rigid plastics, visit [www.AmericanChemistry.com/Plastics](http://www.AmericanChemistry.com/Plastics). Also, visit [www.PlasticsMarkets.org](http://www.PlasticsMarkets.org), maintained by Moore Recycling Associates, for markets and information on handling guidelines. This report and others on plastic recycling can be found at [www.MooreRecycling.com/m\\_02\\_00.html](http://www.MooreRecycling.com/m_02_00.html).

### **Disclaimer**

The 2012 National Report on Postconsumer Non-Bottle Rigid Plastics Recycling has been prepared to provide information to parties interested in the recycling of plastics, in particular non-bottle rigid plastic materials. Facilities developing a recycling process and all entities involved in the chain of collection, processing, distribution, and sale of recycled products have an independent obligation to ascertain that their plans, actions, and practices meet all relevant laws and represent sound business practices for their particular operations. Facilities may vary their approach with respect to particular operations, products, or locations based on specific factual circumstances, the practicality and effectiveness of particular actions and economic and technological feasibilities. This report is not designed or intended to define or create legal rights or obligations. ACC does not make any warranty or representation, either express or implied, with respect to the accuracy or completeness of the information contained in this report; nor does ACC assume any liability of any kind whatsoever resulting from the use of or reliance upon any information, conclusion, or options contained herein. The American Chemistry Council sponsored this report.

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