

2009 National Report on Postconsumer Non-Bottle Rigid Plastic Recycling

Prepared for the American Chemistry Council

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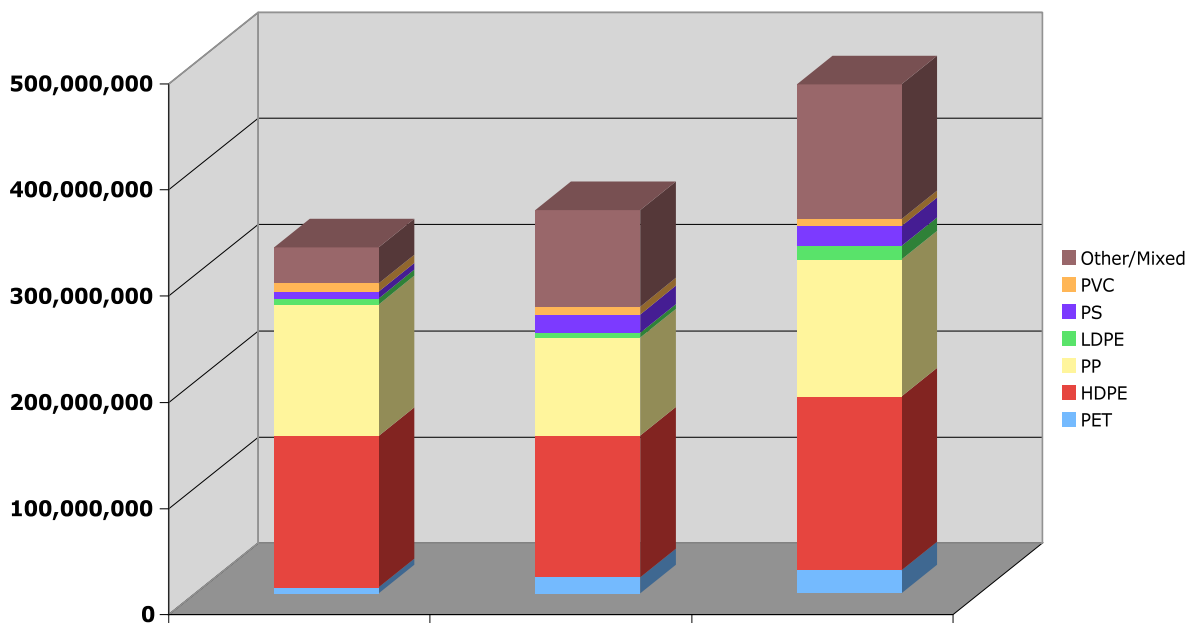
Introduction

The 2009 National Postconsumer Recycling Report on Non-Bottle Rigid Plastics is the third annual report on U.S. pounds of postconsumer non-bottle rigid plastics—packaging and non-packaging—recovered for recycling. Research for this report was conducted by Moore Recycling Associates Inc. of Sonoma, California, for the Plastics Division of the American Chemistry Council (ACC) of Washington, DC.

Executive Summary

A minimum of 479 million pounds of postconsumer non-bottle rigid plastic was recovered in 2009. This represents a remarkable increase of 33% over 2008 and a 47% increase since 2007. This dramatic growth in the recycling of non-bottle rigid plastics is particularly noteworthy in light of the relatively slow growth in Municipal Solid Waste recycling, which grew a total of 3.6% from 2005 to 2008 according to US EPA data¹.

Non-Bottle Resins Recovered for Recycling: Year Over Year



¹ US EPA Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2008

This increase is primarily due to increased non-bottle collection efforts by communities around the country but also to continued progress in getting more companies to report this data.

In order to determine an accurate estimate of pounds of non-bottle rigid plastic recovered in 2009, both domestic and export postconsumer markets were surveyed. The information obtained is based on postconsumer recovery data reported by 25 plastic processors/end-users (6 more than in 2008), and 35 exporters (9 more than in 2008). Data also was obtained from the National Association of PET Container Resources (NAPCOR) on the non-bottle portion PET reclaimers recovered. Most of the exporters reported increased purchases of mixed rigid and non-bottle rigid material. Some reclaimers increased purchases, but a handful decreased purchases of mixed rigid bales in 2009, likely due to the rebounding of export market prices.

As more and more buyers compete for the collected supply of polyethylene bottles, some reclaimers have begun processing non-bottle HDPE and PP containers to produce resin for new end products. There are also U.S. reclaimers that have the sorting and processing technology and the end product applications that allow them to mix together a number of different resins.

Plastic scrap prices and demand remained sluggish the first quarter of 2009 as they were still under the influence of the global monetary crises that hit at the end of 2008. Pricing rose slowly for the remainder of the year with most plastic scrap commodity prices recovering to approximately two thirds of the all-time pricing high from the summer of 2008. Current pricing and demand is strong and steady.

As noted last year, the market crash of 2008 highlighted the need for strong domestic processing. One key challenge to increasing domestic processing is collecting enough quality material. In order to be profitable, reclaimers require a reliable supply of quality-consistent material. Some of the barriers to getting quality material from mixed bales of non-bottle rigid plastics are:

- A lack of clear terminology and reclaimer-generated bale specifications for non-bottle rigid plastics,
- Incentives for MRFs to “divert” materials as inexpensively as possible coupled with their ability to export low-quality, mixed resin bales to China,
- A lack of consistent and clear education to consumers about recycling non-bottle rigid plastics.

The American Chemistry Council and the Association of Postconsumer Plastics Recyclers (APR) are making efforts to address these barriers, but municipal officials are key to addressing the issue of improving the quality of bales generated

at MRFs. Municipal contracts with MRF operators should require operators to create product bales that are not just saleable, but contain a minimum of waste or out-throws, as well. If the issue of quality is not addressed it will obstruct progress in developing domestic non-bottle plastic reclamation.

As stakeholders work together and collection continues to expand—creating a consistent, reliable supply of quality material—we expect to see new, vital investment in sorting and reclamation capacity for non-bottle rigid plastics.

Findings

In 2009, a minimum of 479 million pounds of non-bottle rigid plastics was collected for recycling in the United States. Approximately 51% of the material was manufactured into new products in the United States or Canada and the remainder was exported, primarily to China.

Non-bottle Rigid Plastic Export vs Domestic



Between 2007 and 2008, the ratio of export to domestic purchases flipped. In 2009, we saw domestic purchases increase slightly and export purchases rebound to above their 2007 levels. This is due to the export market’s recovery from the Q4 2008 crash in the market, which resulted in companies exporting for only three quarters of the year: the last quarter of 2008 produced little activity and almost no export of material.

Postconsumer Non-Bottle Rigid Plastic Recovered

Year	Exported	Purchased for use in United States or Canada	Total
2009	236,104,896	243,115,190	479,220,086
2008	137,132,799	223,642,898	360,775,697
2007	204,040,000	121,400,000	325,440,000

Non-bottle rigid plastic is sold in a variety of single-resin and mixed-resin categories. The value placed on most mixed-resin bales is dependent on the likely percentage of polyolefin plastics in the bale: higher percentages of polyolefin (Polyethylene – HDPE, LDPE and Polypropylene - PP) generally are in higher demand. When sold into the marketplace, it is categorized in many different ways.

Clearly, one of the barriers to additional demand for non-bottle rigid plastics is the lack of bale definitions and specifications for different types of mixed plastic bales. This leads to a wide variety in quality and in content of bales. Potential buyers of non-bottle plastic need a quality-consistent supply of feedstock. APR's Non-Bottle Rigid Plastic Recycling Program has made significant progress by identifying seven different types of mixed rigid bales and assigning them names. They are in the process of developing bale specifications for each bale type. In 2010, the APR program also commissioned a mixed rigid bale composition study to determine the content of these bales.

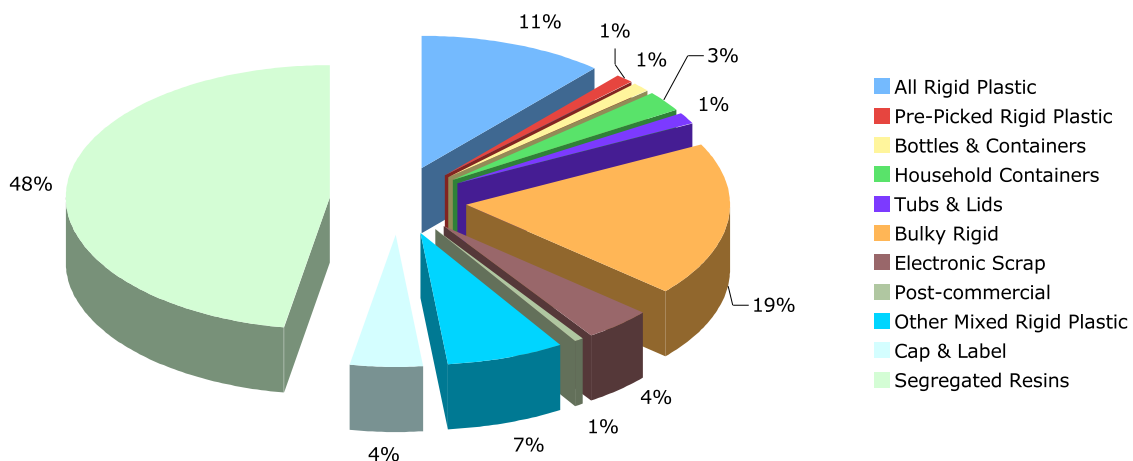
Based on APR's work, the following list of common mixed rigid plastic bale categories has been updated since the 2008 report to the following:

- 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 - Non-PET/HDPE 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)
- Bottles & Containers - All bottles, AND all household non-bottle containers (includes thermoform packaging, cups, trays, clamshells, food tubs)
- Household Containers - All household non-bottle containers (includes thermoform packaging, cups, trays, clamshells, food tubs), with Non-PET/HDPE Bottles

- Tubs & Lids - PP, PE non-bottle household containers
- Olefin Bale - PP, PE non-bottle household containers AND PP, PE bulky rigid plastic
- Bulky Rigid - All bulky rigid plastic (includes carts, crates, buckets, baskets, toys, lawn furniture)
- Mixed Electronic Scrap – primarily HIPS, ABS, PC
- Other Mixed Rigid Plastic – a “catch all” category defined on a case by case basis

The following chart shows the sources of the non-bottle rigid material reported in the survey.

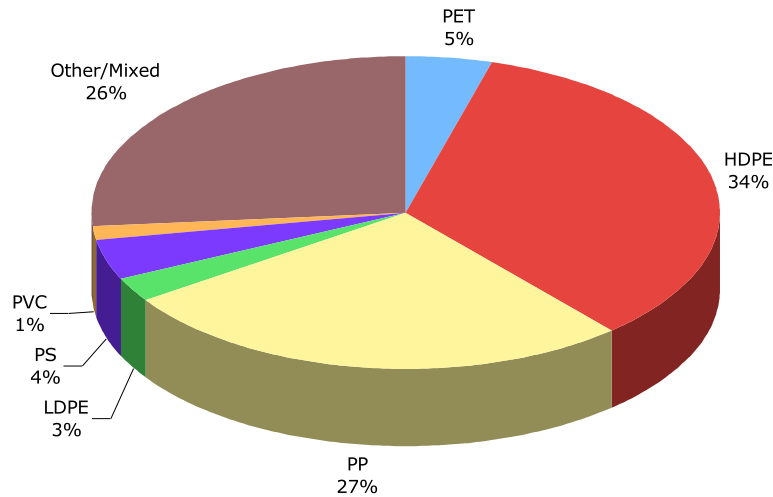
Sources for Non-Bottle Rigid Data



A large percentage of non-bottle rigid plastics collected for recycling was polyolefin material (HDPE, LDPE, PP). This material generally has the highest value with both domestic and export markets because of the variety of products into which it can be used and its ease of re-use processing compared to the other resins. Some reclaimers remove the non-olefin portion of mixed rigid bales. These reclaimers generally rebale the non-olefin portion for export sale where there are markets. Some is sold to other domestic reclaimers, some could be recovered for energy value, and occasionally it is thrown away.

The chart below illustrates the percentage breakdown of the individual resins making up the non-bottle rigid plastic recovered for recycling in 2009.²

Postconsumer Non-bottle Rigid Plastic Recovered in 2009



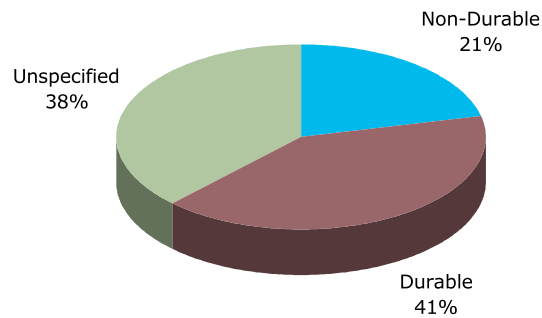
PET	HDPE	PP	LDPE	PS	PVC	Other/ Mixed
21,593,649	163,818,329	128,582,651	12,766,348	18,847,166	6,704,337	126,907,606

The “other” resin category comes from three sources. One is the material reported as “Other Rigid Plastic” but not further identified into a specific resin or identified as a mix of resins, (i.e. electronic/ computer scrap). The second source is material reported as a resin other than 1-6 (e.g., polycarbonate or ABS). The last source is from the percentage of mixed bales allocated as “other” during the 2010 hand separated bale sorts. A portion of the material was resin other than 1-6 and a portion in the mixed-resin bales was unidentifiable and was put in the “other” category.

² The breakdown is based on material reported as specific postconsumer non-bottle rigid plastic resins, as well as percentages applied to each of the mixed rigid plastic categories. The percentages are based on hand separated bale sorts done in 2010. The previous two reports used 2008 composition data.

Out of the 479 million pounds collected for recycling, 194 million pounds (~ 41%) are durable goods, including items like pallets, drums, crates, carts, 5 gallon buckets, and electronic housings.

**Breakdown of Durable and Non-Durable Goods
Non-bottle Rigid Plastic Recovered in 2009**



Collection

There are compelling reasons to add non-bottle rigid plastics to recycling collection programs:

- Most MRFs are already pulling & selling non-bottle rigid plastic
- Domestic and export markets are available
- Several mixed resin grades have a high scrap value (> \$ 200 per ton)
- A steady supply encourages domestic investment in reclamation capacity
- It has the potential to reduce public confusion about which plastics can be recycled and to increase the volume of the already collected plastics by telling consumers to save all rigid plastic
- Manufacturers need assurance that there will be a steady stream before they invest in using PCR
- Collecting all rigid plastic provides an opportunity to increase diversion/ recycling rates

Non-bottle rigid plastics are captured in a variety of ways. Some are collected as part of commercial recycling efforts (e.g., used crates and pallets, or some e-scrap) and other material is collected at the community level. Community programs vary widely from curbside to drop-off depending on what materials municipal collection programs accept, and how and to whom MRFs market their materials. There are also examples of companies starting their own community based non-bottle rigid plastic collection programs for their own products or for specific resins.

Curbside

MRFs generate wide variations in the quality of bales of non-bottle rigid plastics in part because there are many potential combinations of product types and resins in this broad category and because community programs vary widely in their consumer education and their descriptions of which non-bottle rigid plastics they collect. Most municipalities that collect non-bottle rigid plastics accept household containers, but a growing number also are adding bulkier rigid plastics, such as toys, lawn furniture, laundry baskets, etc.

Shown below is a small sample of how various communities ask for rigid plastics:

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- | | |
|--|---|
| <ul style="list-style-type: none">• All Household Containers 1-7• All Plastic Containers• All Rigid Plastic Containers• Plastic Tubs and Bottles• Rigid Plastics with the Recycling Numbers 1-7• All Bottles and Containers Labeled #2, 4, or 5• All Bottles and Containers 1-7• Plastics - Milk cartons, soft drink liter bottles, water bottles, liquid detergent bottles, fabric bleach bottles, shampoo bottles | <ul style="list-style-type: none">• All household product containers with #1, #2, #3, #4, #5, #6 & #7 stamp and plastic toys and tools if identifiable by one of these numbers.• Any material made of plastic; the recycling code is not necessary• Plastics Labeled 1-7
All Plastic Bottles, Tubs and Lids• All plastic labeled on or near the bottom with a 1-7 recycling symbol• Plastic Food and Beverage Containers (bottles and tubs)• PET: soft drink bottles, photo film• All Clean Plastic |
|--|---|
-

The number of community programs handling mixed rigid plastics continues to increase. ACC commissioned a study to determine the percentage of the U.S. population with access to recycle different types of plastic. The results are expected in early 2011.

Some MRFs (particularly on the West Coast) sort out the higher value plastic (PET and HDPE bottles) and then bale the remainder of the rigid plastics together. Others just mix all rigid plastic together. Yet other MRFs have tailored their sorting operations to meet domestic or local market specifications, generally focusing on the olefin plastics.

Other types of collection

Communities also have drop-off collection programs for specific types of products, the most widespread in the category of non-bottle rigid plastics are the e-scrap collection programs. In many cities electronics are banned from being placed in the garbage. These programs provide a place for electronic products to be disposed of and also produce the majority of the plastic electronic and computer scrap reported in this survey—4% of the total non-bottle rigid material reported.

The U.S. EPA considers products used by businesses, also referred to as post-commercial, to be postconsumer. These products have met their intended use and are typically gathered when there is a large enough quantity and sold directly by a commercial business to brokers or reclaimers. These products include totes, crates, pallets, etc. Such commercial materials are often products used for transporting and storing other goods. Reclaimers that specialize in processing post-industrial material often will take this material because it is usually sold as a large quantity of a single resin or product type and is typically cleaner material than you might find coming off a curbside stream.

There is a growing trend of manufacturing companies creating community collection programs for their own products or to amass a specific resin that isn't contaminated by the curbside stream. These programs typically are mail-back or drop-off programs. As with most recyclables, drop-off programs allow for more control over what is received and the material is cleaner. Companies with these programs conduct them at their own cost as a corporate responsibility initiative and for the supply of raw material.

Marketplace

Quality

Quality standards are weak at best. This is due to competition for supply and a lack of direct feedback between Chinese converters and U.S. suppliers. Some exporters and domestic buyers are attempting to focus more on quality, but the nature of how China imports and handles scrap plastic is stifling these efforts. Processors in China tend to be small family-based businesses that purchase from brokers—they have no direct connection with their overseas suppliers and limited ability to give those suppliers feedback on material quality. This lack of adherence to quality standards is a significant barrier to developing more domestic reclamation capacity.

Domestic Capacity

The total North American capacity for processing non-bottle rigid plastic is approximately 627 million pounds per year. About one third of this capacity is into

mixed-resin products such as lumber, railroad ties, garden products and transport packaging. These users prefer the olefin fraction but in some cases will tolerate and use some non-olefin bottles and containers.

The remainder of the capacity is for clean large PE and PP items. Most of these buyers are seeking bulky rigid materials such as buckets, crates, tubs, toys, storage bins and lawn furniture. These buyers are less (or in some cases not at all) interested in small HDPE containers such as yogurt cups and butter tubs, which usually require washing prior to end use.

2009 Market

Throughout the year, the export market was the price leader for most grades of mixed rigid plastic. In the Eastern United States, the domestic market was able to out-compete exporters for higher-grade bulky rigid plastic, especially during the second and third quarters of 2009.

Plastic scrap prices and demand remained sluggish the first quarter of 2009 as they were still under the influence of the global monetary crises that hit at the end of 2008. Pricing rose slowly for the remainder of the year with most plastic scrap commodity prices recovering to approximately two thirds of the all-time pricing high from the summer of 2008. Current pricing and demand is strong and steady for most grades. Pricing and demand for higher grade material typically remain strong despite economic influences because this material requires less processing and is therefore less costly, allowing the end product to be more profitable.

End-Use Markets

As noted, other than electronic housings, buyers base the value of non-bottle mixed-resin bales on the amount of polyolefin plastics in bales. The primary domestic end uses for non-bottle rigid plastics are composite products, such as lumber and railroad ties, and relatively thick-walled injection products such as pots and crates. In addition, a number of companies compound these materials and sell to manufactures that make shapes and forms, or roto-molded products such as tanks and carts.

There are compelling reasons to improve the domestic reclamation infrastructure for non-bottle plastics recycling. No matter where it is done, recycling is beneficial to the environment³ and the economy, but we should not wholly rely on China as our market for plastic scrap. By doing so we are exporting jobs, and other

³ Final Report - LCI of 100% Postconsumer HDPE and PET Recycled Resin From Postconsumer Containers and Packaging – April 7, 2010

downstream benefits, and we are essentially exporting energy. Recycling benefits are strongest when local. For example, studies have shown that:

- The plastic recycling industry has the highest employment rate, when compared to other materials recycled or any material disposed (Seldman 2006)
- Plastic recycling creates the highest recycling industry employment potential (R.W. Beck/NRC 2001)
- Recycling creates jobs and positively helps our economy (Goldman/CIWMB 2001)
- Plastic and non-ferrous metals have the highest economic value per ton, when compared to the other materials in the five major materials categories (steel, plastic, non-ferrous metals, paper and paperboard and electronics (Cascadia 2009)
- Exporting materials causes job loss in the United States. (Friends of the Earth, 2010)
- Recycling plastic generates revenue and can help avoid disposal costs (CIWMB 2003)
- Recycling plastic utilizes embodied energy and extends the life of limited resources (Cascadia 2009)

To further develop the domestic infrastructure to recycle non-bottle rigid plastics, domestic end users will require a consistent supply of quality material. One way to improve the quality is for MRFs to enforce the bale specs being produced by the Association of Postconsumer Plastic Recyclers. To generate such a consistent supply of quality material will require a significant investment into sorting and reclamation capacity. In order to justify such an investment, funding organizations need to see a steady supply of material, appropriate and affordable technology for converting the raw material, and consistent end markets. If the growth seen in 2009 for non-bottle rigid plastic collection continues, it is likely there will be enough supply to warrant these investments in infrastructure.

This report is a step toward documenting the availability of raw material. There also is a need to test the efficacy of various types of plastic sorting technologies and illustrate further the depth of current and potential demand for products made with recycled materials. Such information about rigid plastic recycling should be made available for the banking community to enhance the opportunity for investment. Yet, these steps will not bear fruit unless municipal officials address the issue of improving the quality of bales generated at MRFs. Municipal contracts with MRF operators should require the operator to create product bales that are not just saleable but have a minimum of waste or out throws as well.

As these actions occur and collection continues to expand, creating a consistent reliable supply of quality material, we will likely see new and vigorous investment in sorting and reclamation capacity for non-bottle rigid plastics.

Additional Information

The Plastics Division of the American Chemistry Council provides resources to communities, businesses and consumers to assist them in increasing awareness and education of the recycling of plastic bottles and containers. For information about non-bottle rigid plastics recycling visit www.americanchemistry.com/Plastics. Also, visit www.plasticsmarkets.org for markets and information about handling guidelines.

The 2009 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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