

STAYING FLEXIBLE ON RIGID PLASTICS

The recovery rates for non-bottle rigid plastics have been climbing steadily for years, yet little is known about how best to process these materials. The latest research and independent surveys of processors present a solid technical assessment of the best ways to process rigid containers.

By Patty Moore

Use of rigid plastic containers and packaging has grown significantly over the past decade. The number of community programs handling mixed rigid plastics has also increased, primarily because of increased demand from domestic and export buyers. Buyers placed an increasingly higher value on this material beginning in mid-2005, when virgin resin prices for PE jumped. High virgin resin prices made mixed rigid plastics an attractive low-cost raw material.

Earlier this year, the Plastics Division of the American Chemistry Council (ACC) released its inaugural report on the material, titled the 2007 National Post-Consumer Recycling Report on Non-Bottle Rigid Plastics. Research for the report was conducted by Moore Recycling Associates Inc.

In 2007, a minimum of 325.44 million pounds of non-bottle plastics were collected for recycling in the United States. Approximately two-thirds of the material was exported, primarily to China, and the remainder was used to manufacture new products in the U.S. or Canada.

Of the 325 million pounds collected for recycling, approximately 55 percent of that tonnage was classified as durable goods, including items like pallets, crates, carts, five-gallon buckets and electronic housings. A large percentage of non-bottle plastics collected for recycling was polyolefin material (Figure 1). This material generally has the highest value in both domestic and export markets because of the variety of products into which it can be used and its comparative ease of separation and re-use processing, as compared to the other resins.

Collection

As noted, the number of community programs handling mixed rigid plastics continues to increase. Unfortunately, community programs vary widely in regards to consumer education efforts and the program's description of recyclable non-bottle plastics. This has lead



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.allplasticbottles.org and www.americanchemistrycouncil.org/plastics. Also, visit www.plasticsmarkets.org for markets and information about handling guidelines.

to confusion and uncertainty: consumers are not sure which plastic to include in their recycling programs and buyers are not sure what type of materials they are buying.

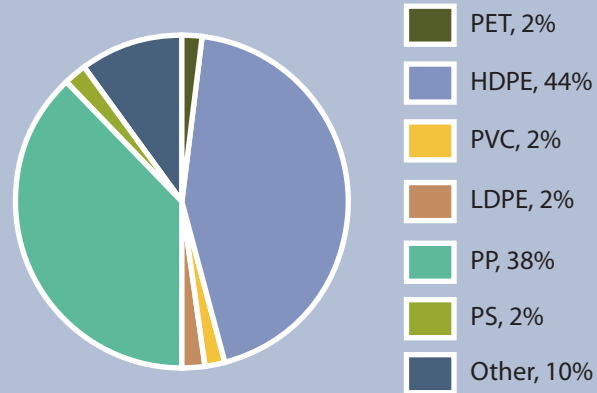
Last year, Moore Recycling Associates determined that 28 of the 100 largest U.S. cities collect some type of rigid plastics – beyond bottles – through curbside programs. Many of the cities that collect rigid plastics are concentrated in California. Most of the Midwestern cities that collect non-bottle rigid plastic have access to a large materials recovery facility (MRF) that has broad market power throughout the U.S. (e.g., Waste Management). The survey conducted for ACC was limited to the 100 most populous cities in the U.S. However, many other communities, beyond the 28 largest cities, collect non-bottle rigid plastics as well, including Montgomery County, Maryland and Boulder, Colorado.

In California, 62 percent of the population (22,614,925 people) has access to curbside collection of *all* plastic containers, either through programs that accept “all rigid plastics” or “all plastic bottles and containers” (Figure 2).

Financial impact/ market conditions

From the survey, no communities reported a cost associated with their expansion of plastic collection. Most also said their program underwent multiple changes (e.g., single-stream, contract negotiations to account for rising fuel costs, etc.) at the time of expansion, thus they were unable to draw a conclusion about the specific cost impact of expanded plastics collection. Some communities did mention a slight reduction of landfill costs associated with plastics

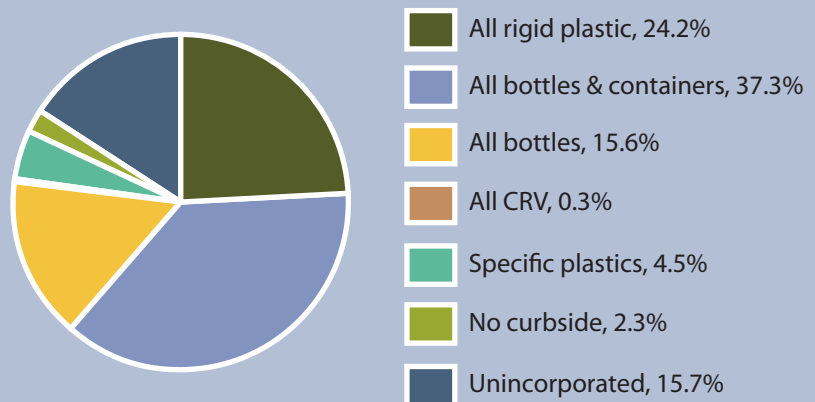
Figure 1 | Percentage breakdown of individual resins



Note: “Other” includes some Nos. 1-6 resins not easily identified during bale characterization studies.

Source: Moore Recycling Associates, Inc., 2008

Figure 2 | California curbside collection of plastics (by percent of total population)



Source: Moore Recycling Associates, Inc., 2008

expansion.

It is important to note that San Jose, California began collecting non-bottle rigid plastics in 2002. Fremont, California and Fort Worth, Texas also expanded collection in 2003 to recognize rigids. In 2002, market prices were slightly lower than the current value. The decision to expand collection is based on finances and the program’s ability to move material. Some communities are willing to recycle in order to reduce landfill costs. If there’s a processor able to accept the material, some communities will collect it, even if the material has minimal current scrap value.

MRFs

MRFs generate wide variations in the type and quality of bales of non-bottle plastics. As with other commodity materials, quality has not always been a high priority with the export market. This is due to strong competition and the lack of direct feedback between converters and suppliers. The processors in China tend to be small family-based businesses that purchase from brokers – they have no connection with suppliers. This is the fundamental reason for the wide variation in quality of bales shipped overseas. Most MRFs (particularly West Coast facilities) sort out the higher value

plastic (PET and HDPE bottles), then bale the remainder of the rigid plastics together, marketing these as a “mixed rigid” plastic bales. Some MRFs have tailored their sort operations to meet domestic or local market specifications.

In California, of the 89 MRFs identified for this survey, 84 presently sort and sell bales of mixed Nos. 3-7 bottles, and all containers. In addition, there are 80 MRFs that also bale bulky rigid plastics (also called injection plastics).

Marketplace

Non-bottle rigid plastic is sold in a variety of single-resin and mixed-resin categories. When sold into the marketplace, it is categorized in many different ways. Approximately one quarter of the non-bottle rigid plastic recycled in 2007 was sold as single-resin items, such as hangers, battery cases, crates, pallets, carts, bottle caps and other floatable items from PET reclaimers. The remainder was sold in mixed-resin bales. Listed below are the most common mixed resin categories:

- Injection plastic (also called bulky rigid plastics) – primarily PE and PP, and includes carts, crates, buckets, baskets, car bumpers, etc.
- Electronic housings – primarily HIPS-ABS-PC
- Commingled bottles and containers – generally includes Nos. 3-7 bottles, Nos. 1-7 containers and/or all bottles and containers in some instances
- Mixed rigid plastics – includes injection PE and PP mixed with Nos. 3-7 bottles and Nos. 1-7 containers
- Tubs and lids – includes Nos. 1-7 containers
- Other rigid plastics – a “catch all” category defined on a case-by-case basis.

End-use markets

National capacity for mixed rigid plastic and commingled bottles and containers was approximately 70 million pounds per year in 2007. Most of the capacity is into mixed resin products, such as lumber, railroad ties, garden products and transport packaging. These users prefer the olefin fraction, but will tolerate, and do use, non-olefin bottles and containers (the exception to this is that most pull out all PET and PVC bottles and none want EPS).

There is a strong market for clean large PE/PP items – in excess of 240 million

Table 1 | Post-consumer non-bottle rigid plastic (in pounds)

<u>Year</u>	<u>Exported</u>	<u>Purchased for use in North America</u>
2007	204,040,000	121,400,000

Source: Moore Recycling Associates, Inc., 2008

pounds per year of domestic capacity. 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) interested in such small HDPE containers as yogurt cups and butter tubs.

The market price for non-bottle rigid bales was consistent throughout 2007. The domestic market was the price leader for injection-grade materials. The export market, primarily China, was the price leader for all other mixed-resin bales. In 2008, markets remained strong until October when, like most commodities, prices plummeted. Demand for mixed-rigid bales has slowly increased through 2009. Demand, if not prices, now meets or exceeds that of 2008. China is now the price leader for all types of post-consumer scrap plastic.

Barriers

The October 2008 drop in the demand and price for rigid plastic scrap in China highlighted the need to expand domestic markets for non-bottle plastics. The potential domestic end-market for non-bottle plastics is very large, but there are several barriers to realizing the potential domestic market demand. The primary barrier continues to be the willingness of Chinese buyers to accept low-quality, mixed-resin bales at relatively strong prices. Coupled with this is the lack of clear definitions and specifications for different types of baled plastic. This leads to a wide variety of quality and content of bales. Potential buyers of non-bottle plastic need a consistent supply and quality of feedstock before they will invest in reclamation infrastructure. The random nature of present collection and processing efforts in the U.S. makes this consistent quality supply difficult.

Another major obstacle to non-bottle rigid plastic recycling is communicating clear and consistent information to the public, so they know what to do with any given plastic type. Listed below are examples of the many disparate ways that community programs instruct residents to recycle plastic materials:

- Household containers (Nos. 1-7)
- All clean plastic
- Plastics labeled Nos. 1-7
- Bottles and containers (Nos. 1-7)
- Plastic containers
- All rigid plastic containers
- Plastic tubs and bottles
- Plastic food and beverage containers (bottles and tubs)
- Rigid plastics with the recycling numbers 1-7

In order for the domestic market to develop, potential users will require a consistent supply of clean, single-resin material. To generate such a supply will require, at a minimum, clear and consistent education to consumers about what products to place curbside for collection, as well as enforceable reclaimer-generated bale specifications for the various categories of non-bottle rigid scrap plastics.

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

In the end

The number of programs handling mixed rigid plastics has increased significantly over the past few years. In fact, export buyers have been aggressively seeking mixed rigid plastics since the middle of 2005, as quality has not been a high priority with the export market. Most MRFs are able to sort out the higher value plastic materials (bottles), then bale all the remaining plastic, marketing it as a “mixed rigid” bale. Some MRFs have tailored operations to meet domestic or local market specifications.

The last few years of strong export markets, coupled with the export market’s lack of material quality feedback, has discouraged potential domestic users from investing in end-markets or the technology needed to process non-bottle mixed resins into usable post-consumer resin. In order to expand

domestic markets, potential buyers need to be confident of a consistent supply of quality material and steady end-use buyers. **PRU**

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