

Report on

# Postconsumer PET Container Recycling Activity in 2013



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[www.napcor.com](http://www.napcor.com)



The Association of Postconsumer  
Plastic Recyclers

[www.plasticsrecycling.org](http://www.plasticsrecycling.org)

**INTRODUCTION**

2013 marks the nineteenth year that the National Association for PET Container Resources (NAPCOR) has issued this report in its current format, and the ninth year that NAPCOR and The Association of Postconsumer Plastic Recyclers (APR) have worked together to produce it.<sup>1</sup> This report would not be possible without the APR's support and the cooperation of its members. It is intended to provide the reader with a detailed overview of the recycling of injection stretch blow molded polyethylene terephthalate (PET) bottles and jars in the United States during 2013, and a general summary of the recycling of PET thermoforms. Information contained in this report was obtained through surveys conducted by HDR, Inc. and Moore Recycling Associates, and from data generated internally by NAPCOR and L.O.M. Enterprises. In order to present as accurate a picture of these activities as possible, additional data and information were obtained through discussions with individual collectors, intermediate processors, reclaimers, converters, brokers, exporters, importers, resin producers, bottle manufacturers, public recycling officials, consultants, and other key industry members.

**PET BOTTLES AVAILABLE FOR COLLECTION**

The total weight of PET bottles and jars available in the United States for recycling in 2013 was 5,764 million pounds, a three percent increase over 2012. This number reflects the total amount of PET resin used by U.S. bottle manufacturers from U.S., foreign, and recycled sources, with adjustments for scrap generated and not reused, exported bottles and pre-forms, and bottles less than eight ounces in size. This 5,764 million pounds serves as the denominator in this report to determine both the recycling and utilization rates; it includes 475 million pounds of postconsumer PET recyclate.

The amount of PET bottles in the U.S. marketplace, and potentially available for collection, reflects various market factors and trends. Recycled material volumes used in domestic bottle production continued to increase in 2013. In addition, volume sales of carbonated soft drinks were down, yet were up for bottled water. Although the impacts of lightweighting, as discussed in previous reports, have been realized to a large extent, container manufacturers continue to innovate and bottle weights are still trending downward. Brands and bottle manufacturers also continued to downsize select bottles in 2013, moving to smaller serving sizes to better suit consumer demographics and preferences.

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<sup>1</sup> This report will generally show data for the last 10 years. Earlier years' reports are available at [www.napcor.com/PET/pet\\_reports.html](http://www.napcor.com/PET/pet_reports.html).

**POSTCONSUMER PET BOTTLE PURCHASES**

The total amount, by weight, of postconsumer PET bottles collected for recycling and sold in the United States in 2013 was 1,798 million pounds. The breakdown of this total, by purchaser, is as follows:

**TABLE 1: Recycling Rate Numerator**

1,328.8	Purchased by U.S. Reclaimers
456.4	Purchased by Export Markets
12.5	PET bottle component of mixed bales exported
<b>1,797.7</b>	<b>Total Postconsumer Bottles (MMlbs)</b>

This represents an 80 million pound increase in total volume of bottles collected over 2012, resulting in a slight increase in the overall PET bottle recycling rate to 31.2 percent.

Both positive and negative factors impacted collections in 2013. On the positive side, California’s CRV program volumes increased by more than 11 million pounds over 2012 levels; material in other beverage container deposit programs increased slightly; and, most notably, the amount of material purchased from material recovery facilities (MRFs) increased significantly. While it is difficult to pinpoint the source of the increase in volume through MRFs, it is likely the result of upgrades to certain residential collection programs, particularly through conversion to cart-based collection systems, and increasing access to recycling in the commercial sector, at public events, and at other public venues. In addition, given the reduced markets for mixed resin bales, due in large part to the pressures of China’s “Green Fence” policy, MRFs may have been incentivized to move materials from mixed resin bales to PET bales.

**PET Thermoform Recycling**

In 2013, PET thermoforms collected for recycling in the U.S. and Canada topped 60 million pounds, an increase of 25 percent over 2012’s 47.8 million. Notably, PET thermoforms sold to export markets dropped by 44% to 12.5 million pounds in 2013. PET thermoform collection volumes are not included in the recycling rate presented in this report, or in the bottle volumes purchased, but are included in “flake produced from all sources” totals cited on page 9.

This increase in PET thermoforms recycled domestically illustrates that the work of NAPCOR and its partners to ensure stewardship of a fast-growing PET packaging segment, and develop a promising new source of supply, has begun to pay off.

Despite this progress, NAPCOR’s goal of making PET thermoforms as easy to recycle as bottles is not yet within reach. While many are enthusiastic about incorporating this new source of supply, some PET reclaimers still exclude PET thermoforms from their incoming material specifications.\* Given the challenges reclaimers face with recent increases in contamination and low bale yields, the potential for increases in “look-alike” packages (e.g., OPS, PVC, PETG, PLA), non-recyclable labels, inks and adhesives, and other technical and practical factors put a damper on market growth. In 2014, NAPCOR continues to perform research and technical trials to address these concerns and overcome the obstacles to broad-scale PET thermoform recycling.

Recycling programs and MRFs interested in marketing PET thermoforms should talk to their buyers about market opportunities. As they move to implement programs, it is critical that collectors and processors implement best practices to minimize contamination and maximize quality.

\* For list of PET reclaimers who accept PET thermoforms: <http://rrsinc.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=0b10fb7d1045444ca894e4ba4450e339>

This progress was countered by several other trends, including the continued impact of lightweighting and downsizing of single-serve beverage containers, as previously mentioned. The downward trend in sales of carbonated soft drinks also had a negative impact, making less material available for recycling, particularly through deposit programs. Furthermore, several states with mature recycling collection programs reported a slight decline in curbside volumes collected.

United States reclaimers increased their purchases of U.S. bottles by 194 million pounds, or 17 percent, as compared to 2012. This accounted for 74 percent of all U.S. bottles collected. United States reclaimers also reported supplementing their domestic purchases by importing 149 million pounds of postconsumer bottles or dirty flake, predominantly from Canada, Mexico and Central and South America. In addition to the bottle volumes as presented in Table 2, domestic reclaimers reported buying 76 million pounds of alternative feedstock, which included postconsumer thermoforms, pre-consumer bottles, postconsumer strapping, and other unprocessed industrial scrap. In total, U.S. reclaimers purchased 1,587 million pounds of PET scrap material, using more alternative feedstock and imported material than ever before.

Reclaimers outside of the U.S. purchased a total of 469 million pounds or 26 percent of total U.S. bottles collected. This is the lowest volume of material exported since 2004, and the lowest percentage of total collections since 2000. Purchase of U.S. bottles by Canadian reclaimers dropped slightly to 47 million pounds, down from 54 million pounds in 2012. Exports to the Far East, predominantly to Chinese buyers, dropped by 84 million pounds, while exports of the estimated PET bottle fraction of mixed plastic bales also dropped from 35.5 to 12.5 million pounds. Exports outside of North America totaled approximately 420 million pounds.

**TABLE 2: Postconsumer Bottles Recycled / Used by Reclaimers**

<b>POSTCONSUMER BOTTLES</b> <i>Gross Weight Purchases (MMlbs)</i>	<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>	<b>2013</b>
A. Purchased by U.S. Reclaimers	520	631	681	619	641	615	642	776	916	1,135	1,329
B. Purchased by Exporters *	321	372	489	653	755	836	802	781	688	582	469
C. Total U.S. Material Recycled (A+B)	<b>841</b>	<b>1,003</b>	<b>1,170</b>	<b>1,272</b>	<b>1,396</b>	<b>1,451</b>	<b>1,444</b>	<b>1,557</b>	<b>1,604</b>	<b>1,718</b>	<b>1,798</b>
D. Postconsumer Bottle Imports	62	106	109	97	100	98	98	89	106	114	149
E. Total Postconsumer Bottles used by U.S. Reclaimers (A+D)	<b>582</b>	<b>737</b>	<b>790</b>	<b>716</b>	<b>741</b>	<b>713</b>	<b>740</b>	<b>865</b>	<b>1,022</b>	<b>1,249</b>	<b>1,478</b>

\* As of 2005, this number includes the amount of PET sold in mixed bottle bale shipments.

**2013 GROSS RECYCLING RATE**

Total U.S. Bottles Collected and Sold for Recycling = 1,798 MMlbs  


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Total U.S. Bottles Available for Recycling = 5,764 MMlbs = **31.2%**

**TABLE 3: Gross Recycling Rates, 2003 – 2013**

<b>Year</b>	<b>Total U.S. Bottles Collected (MMlbs)</b>	<b>Bottles on U.S. Shelves (MMlbs)</b>	<b>Gross Recycling Rate</b>
<b>2003</b>	841	4,292	19.6%
<b>2004</b>	1,003	4,637	21.6%
<b>2005</b>	1,170	5,075	23.1%
<b>2006</b>	1,272	5,424	23.5%
<b>2007</b>	1,396	5,683	24.6%
<b>2008</b>	1,451	5,366	27.0%
<b>2009</b>	1,444	5,149	28.0%
<b>2010</b>	1,557	5,350	29.1%
<b>2011</b>	1,604	5,478	29.3%
<b>2012</b>	1,718	5,586	30.8%
<b>2013</b>	1,798	5,764	31.2%

**PET BOTTLE BALE MARKETS**

East Coast bale prices held at late 2012 levels throughout the first quarter of 2013, softening by year’s end, but remaining relatively stable. This stability, coupled with reasonably robust virgin PET resin pricing – widely reflective of tight global paraxylene feedstock supplies – allowed PET reclaimers some room to maneuver while still supporting consistent end-use markets.

On the West Coast, early 2013 bale pricing was up around \$.27 per pound, dropping down to the \$.23 per pound range in the Spring, likely attributable to the effects of China’s “Green Fence” policy. PET bale prices rebounded in late summer and held at the \$.25 to \$.27 per pound range for the remainder of year. (West Coast pricing is generally quoted as “delivered” versus East Coast “picked up” as shown in Table 4 below.) Green Fence practices did not stop bale exports from the West Coast, but did raise awareness of bale quality issues. As a whole, PET bale exports out of California ports were down, likely due to a combination of the impacts of the Green Fence and the strength of California’s sizable PET reclamation infrastructure and local buying power.

Top quality California bales mirrored the broader U.S. market in that deposit bales and good-quality dirty granulate continued to be in high demand, supporting price premiums of up to \$.10 per pound or more. These premiums were also an indicator of continued concern over poor bale quality and low yields as the amount of non-PET or otherwise unusable material in curbside bales continued to be pose challenges for PET reclaimers.

**TABLE 4: East Coast, Non-Deposit PET Bottle Bale Prices**  
(Picked Up, Truckload Quantities, Seller’s Dock)

<b>2013</b>	<b>LOW</b>	<b>HIGH</b>
<b>JANUARY</b>	\$0.16 / pound	\$0.20 / pound
<b>FEBRUARY</b>	0.19	0.22
<b>MARCH</b>	0.19	0.23
<b>APRIL</b>	0.18	0.22
<b>MAY</b>	0.17	0.22
<b>JUNE</b>	0.16	0.20
<b>JULY</b>	0.14	0.19
<b>AUGUST</b>	0.13	0.18
<b>SEPTEMBER</b>	0.13	0.18
<b>OCTOBER</b>	0.13	0.17
<b>NOVEMBER</b>	0.12	0.17
<b>DECEMBER</b>	0.12	0.17

**RECLAMATION CAPACITY**

A reclamation plant is defined as an operation that can take dirty postconsumer plastic packaging and process it into a clean flake suitable for remanufacture. At the beginning of 2013, there were 27 U.S. PET reclamation plants in operation, with a combined annual capacity of 2,025 million pounds, gross weight input. By year’s end, there remained 27 plants operating in the U.S. with total annual capacity up slightly at 2,200 million pounds. These plants employ a wide range of technologies, with 14 of the 27 able to produce Food and Drug Administration (FDA) Letter of No Objection (LNO) direct-contact recyclate suitable for food and beverage packaging use.

The 2013 U.S. reclaimer plant utilization rate – total throughput, based on the use of all PET feedstock, expressed as a percentage of total plant capacity – was approximately 72 percent, up significantly from 2012’s 63 percent. This takes into account plants that were semi-operational, those that were shut down, and new plants that were operational for any portion of the year.

**TABLE 5: Production of PET Flake from Bottles in 2013**

Recycled PET (RPET) Production Summary (MMlbs)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
A. RPET Produced by U.S. Reclaimers from U.S. Bottles	412	505	558	523	496	477	477	558	590	785	974
B. RPET Produced by U.S. Reclaimers from Imported Bottles	49	83	85	69	82	87	84	71	77	84	107
C. Total RPET Production U.S. Reclaimers (A+B)	<b>461</b>	<b>588</b>	<b>643</b>	<b>592</b>	<b>578</b>	<b>564</b>	<b>561</b>	<b>629</b>	<b>667</b>	<b>869</b>	<b>1,081</b>
D. Clean Flake Equivalent from U.S. Bottles Exported	255	298	401	529	583	647	601	557	462	396	327
E. Total Clean Flake Produced from Bottles in U.S. (A+D)	<b>667</b>	<b>803</b>	<b>959</b>	<b>1,052</b>	<b>1,079</b>	<b>1,124</b>	<b>1,078</b>	<b>1,115</b>	<b>1,052</b>	<b>1,181</b>	<b>1,301</b>

**PET UTILIZATION RATE**

The PET utilization rate is determined by adding the amount of clean flake produced by U.S. reclaimers to the amount of clean flake expected to be produced from exported bottles, both Canadian and all other (assuming U.S. utilization rates as detailed below); the sum is expressed as a percentage of total U.S. bottles available for recycling. It is related to bale yield, but is not a true measure of bale yield for reasons further explained below.

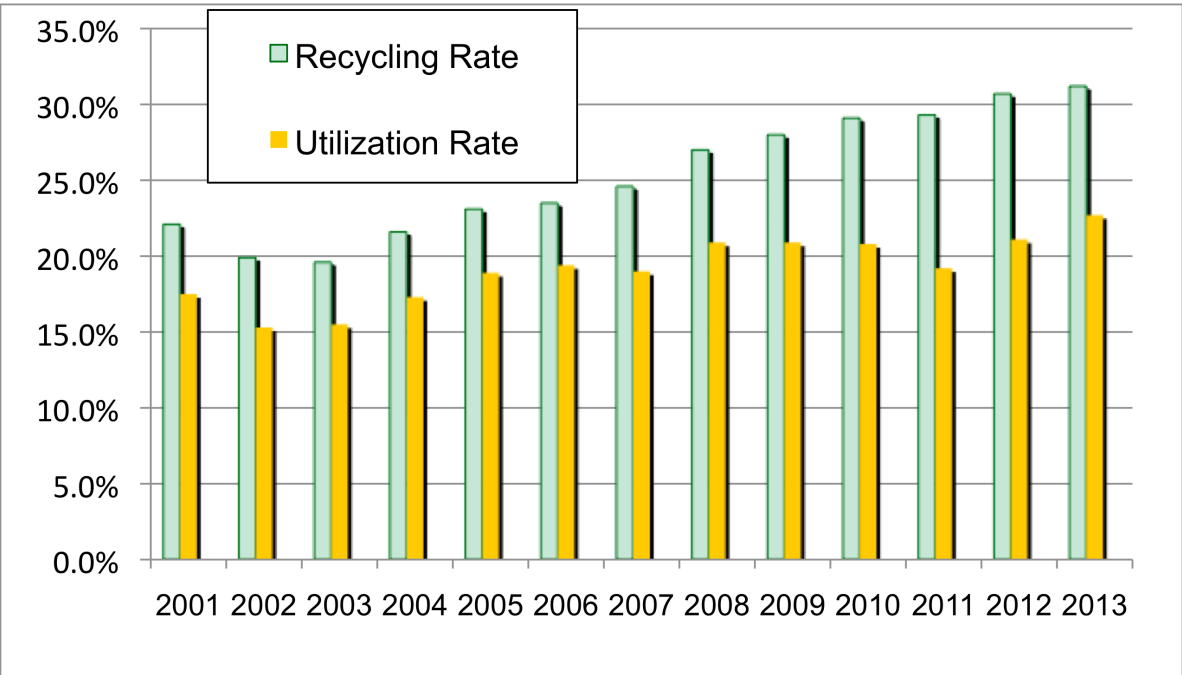
**PET Bottle Material Utilization Rate**

Clean Flake Produced from U.S. Post-consumer Bottles = <b>974 MMlbs</b>	<b>+</b>	Clean Flake Equivalent of U.S. Bottles Exported, Canada and all other = <b>327 MMlbs</b>	
<b>=</b>	<b>1,301 MMlbs</b>	<b>÷</b>	<b>22.6%</b>
Total U.S. Bottles Available for Recycling = <b>5,764 MMlbs</b>			

United States reclaimers’ average material utilization rates – calculated by taking reported clean flake produced as a percentage of reported incoming material purchased – ranged from 75 percent for deposit bottles to 69 percent for curbside material and 77 percent for California CRV. After applying the utilization rates to the various fractions purchased, it was determined that the clean flake equivalent of the 469 million pounds of postconsumer PET bottles shipped export to all locations was 327 million pounds.

As calculated above, the resulting PET utilization rate was 22.6 percent. While this is up slightly from 2012 in relation to the recycling rate as Table 6 illustrates, it should not be viewed as evidence of an improvement in bale quality. The trend of the last six years or so has continued, whereby the amount of clean flake produced no longer parallels the recycling rate. This is reflective of the increasing contamination in incoming materials, particularly in curbside bales. Material utilization rates may not align with bale yields because the report methodology uses survey-derived data of the aggregated volumes of recycled PET container material inputs at point of reclaimer purchase. These inputs reflect a mixture of both baled and dirty flake material. Dirty flake refers to materials that are ground by intermediate processors before delivery to the reclaimers upon whose data this report is based. It tends to contain fewer contaminants than baled bottles, and therefore generates more usable flake per pound of material reported. Furthermore, the utilization rate increase could reflect production from materials that were already in inventory as the year began.

**TABLE 6: PET Recycling & PET Material Utilization Rates**





The worsening quality of incoming PET material continues to add significant cost and operational challenges for reclaimers. The impact of non-PET material in PET bales is compounded as it increases because every step taken to remove contamination – whether during material sorting, washing, and processing – invariably leads to some loss of valuable, usable PET material.

**TABLE 7: PET Utilization Rate**

<b>Year</b>	<b>Clean Flake Equivalent</b> <i>(MMlbs)</i>	<b>Bottles on U.S. Shelves</b> <i>(MMlbs)</i>	<b>Utilization Rates</b>
2003	667	4,292	15.5%
2004	803	4,637	17.3%
2005	959	5,075	18.9%
2006	1,052	5,424	19.4%
2007	1,079	5,683	19.0%
2008	1,124	5,366	20.9%
2009	1,078	5,149	20.9%
2010	1,115	5,350	20.8%
2011	1,052	5,478	19.2%
2012	1,181	5,586	21.1%
2013	1,301	5,764	22.6%

**2013 RPET MARKET**

Use of recycled PET in the U.S. and Canada increased again in 2013, up by 15 percent over 2012, with converter consumption totaling 1,513 million pounds across all product categories (see Table 8).<sup>2</sup> This is the highest converter consumption figure to date and represents a marked increase in this multi-year upward trend. U.S. and Canadian reclaimers supplied about 1,417 million pounds of flake and pellet produced from all sources of feedstock. The remaining 96 million pounds was either: material provided by U.S. recycled PET “upgraders” (companies that purchase dirty PET flake, have it toll washed, then pelletize or solid-state it for resale); or PET imported from reclaimers in countries such as France, Taiwan, China, Mexico, Brazil, Peru and others in Central and South America. United States and Canadian reclaimers also sold 86 million pounds of PET byproducts to secondary markets.

<sup>2</sup> Since the 2009 report, the RPET end-use data reflected in Table 8 has reflected RPET consumption by converters in both the U.S. and Canada.

Notable this year was the continued year-over-year growth in the bottle sector, with Food and Beverage Bottle recycled PET usage up 34 percent to 369 million pounds, and usage in Non-Food and Beverages more than doubling, from 50 to 106 million pounds. When combined with Sheet & Film category’s 315 million pounds, 790 million pounds of recycled PET went back into PET packaging.

Growth in Fiber application end use also stood out in 2013, with a 15 percent increase over 2012 to a total of 558 million pounds used in domestic end market. This reflects continued investment in fiber market applications, primarily in the southeastern United States, as was reported in 2012.

Once again in 2013, the “Engineered Resins” category was folded into “Other,” as there was insufficient survey response in this category to meet standard confidentiality guidelines. Canadian recycled PET end-use markets were also up overall, with particular growth in Fiber and Non-Food and Beverage Bottle applications.

**TABLE 8: RPET used by Product Category (MMlbs)**

Product Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Fiber</b>	296	479	463	422	383	391	344	381	398	512	558
<b>Sheet &amp; Film</b>	32	58	71	74	128	153	159	195	202	307	315
<b>Strapping</b>	77	116	131	132	144	137	114	127	120	136	140
<b>Engineered Resin</b>	10	12	8	9	11	7	10	9	See Other	See Other	See Other
<b>Food &amp; Beverage Bottles</b>	106	126	115	139	136	141	203	216	242	276	369
<b>Non-Food Bottles</b>	24	63	63	49	60	55	65	58	57	50	106
<b>Other</b>	7	24	13	30	38	31	42	16	21	31	25
<b>TOTAL CONVERTER CONSUMPTION</b>	<b>552</b>	<b>878</b>	<b>864</b>	<b>855</b>	<b>900</b>	<b>915</b>	<b>937</b>	<b>1,002</b>	<b>1,040</b>	<b>1,312</b>	<b>1,513</b>

**2013 YEAR-END SUMMARY**

There were several developments or trends of note from 2013 that are worthy of mention:

**Demand** for recycled PET is strong: all of the major end-use markets reported increasing their use of recycled PET in 2013, illustrating solid domestic demand for this material. Use in packaging applications, particularly bottles, increased substantially demonstrating powerful closed-loop systems. This strong demand supports a vibrant PET reclaiming infrastructure that is poised to accept even more material in 2014. With this growth comes an increasingly complex and sophisticated industry with more PET buyers than ever before, and an increasing diversity of recycled material buying

practices suited to individual reclaimer sorting and processing, and end-use market specifications. This diversification may have played into the increased plant utilization rate for 2013, and will be interesting to watch as the market continues to grow and develop in 2014 and beyond.

**Supply quality and quantity** remains major concerns: in 2013, reclaimers still reported crisis-level contamination, particularly in bales of PET generated in curbside programs. Addressing bale quality issues is a top priority moving into 2014.<sup>3</sup> And, while domestic collection is growing, the materials generated by community programs in the U.S. are still not sufficient to meet the demand, both current and potential. While materials flowing through MRFs increased in 2013, demand for recycled PET increased at a greater rate. Reclaimers met that demand by buying materials previously exported, and by importing bottles from Canada, Mexico, and Latin America, but supply of these imports is expected to diminish as those countries' respective infrastructures continue to develop.

**Thermoform Packaging Recycling** is on the rise: the efforts to open recycled PET markets to thermoformed packaging materials began to pay off in 2013, with a 25 percent increase in the amount of that material reclaimed in North America. Greater levels of recycling are still impeded by concerns related to contamination and design for recyclability issues. In 2014, NAPCOR is undertaking technical trials and evaluations to address these issues in the hopes of seeding major market growth.

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<sup>3</sup> Bale quality is impacted both by non-PET material in the bale and by non-recycling compatible PET packaging. Design guidelines available at <http://plasticsrecycling.org/market-development/apr-design-guide-for-plastics-recyclability>