

Report on

Postconsumer PET Container Recycling Activity in 2014



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The Association of Postconsumer
Plastic Recyclers

www.plasticsrecycling.org

INTRODUCTION

2014 marks the twentieth year that the National Association for PET Container Resources (NAPCOR) has issued this report in its current format, and the tenth year that NAPCOR and The Association of Postconsumer Plastic Recyclers (APR) have worked together to produce it.¹ This report would not be possible without the APR's support and the cooperation of its members and NAPCOR's. 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 2014, 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 2014 was 5,849 million pounds, a 1.5 percent increase over 2013. 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 5,849 million pounds serves as the denominator in this report to determine both the recycling and material utilization rates; it includes 394 million pounds of postconsumer PET recyclate.

Several market factors and trends affected the volume of PET bottles on the market in the U.S., and therefore available for recycling collection. Negative factors included the downward trend in carbonated soft drink sales, combined with "right-sizing" of bottles to meet consumer demand for smaller serving sizes. Lightweighting of bottles also continued to have an impact on some specialty beverage categories, as well as still water, although to a lesser extent than in previous years. On the positive side, there was some conversion into PET from other package types, and bottled water sales continued to increase, as did specialty beverage categories such as energy drinks, teas, and ready-to-drink coffees.

¹ This report will generally show data for the last 10 years. Earlier years' reports are available at www.napcor.com/PET/pet_reports.html.

**POSTCONSUMER PET BOTTLE
PURCHASES**

The total amount, by weight, of postconsumer PET bottles collected for recycling in the United States in 2014 was 1,812 million pounds. The breakdown of this total, by purchaser, is as follows:

TABLE 1: Recycling Rate Numerator

1,398	Purchased by U.S. Reclaimers
404	Purchased by Export Markets
10	PET bottle component of mixed bales exported
1,812	Total Postconsumer Bottles (MMlbs)

This represents a 14 million pound increase in total volume of bottles collected over 2013. Because the amount of bottles available for recycling increased in 2014, and the bottles collected also increased, but to a lesser extent, the recycling rate dropped a fraction of a percent, to 31 percent.

Collection volumes in 2014 represent an increase in deposit materials, a very small increase in materials collected at curbside, and a small drop in the amount of material collected through the California CRV (CA CRV) program. The reduction in CA CRV material was likely the result of increased enforcement of fraud in the state.

The stagnant level of recovery was likely due to the continued impact of lightweighting and downsizing of single-serve beverage containers. The downward trend in sales of carbonated soft drinks also had a negative impact, making less material available for recycling. Given the light weight of water bottles, their increase in sales does not compensate for the loss of soft drink containers.

PET Thermoform Recycling

In 2014, PET thermoforms collected for recycling in the U.S. and Canada broke the 100 million pound mark, an increase of 70 percent over 2013's 60.4 million. The dramatic increase was reflected both in collected thermoforms purchased by processors in the US and Canada, and those exported. About one-third of the increase in thermoforms collected was absorbed by North American markets, while two thirds went overseas. Thermoforms purchased by US and Canadian reclaimers increased by more than 30 percent. 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 total reclaimer PET purchases (page 4) and "flake produced from all sources" totals cited on page 9.

The significant increase in PET thermoforms collected for recycling, and purchased by domestic markets, 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, continues to reap great benefits.

Despite this progress, NAPCOR's goal of making PET thermoforms as easy to recycle as bottles is still elusive. While many are enthusiastic about incorporating this new source of supply, some PET reclaimers will only accept PET thermoforms from high quality suppliers who utilize auto-sort equipment, while others exclude PET thermoforms from their incoming material specifications altogether. Given the challenges reclaimers face with recent increases in contamination, 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 continue to hinder the broad scale acceptance of this growing stream. In 2015, NAPCOR continues to work 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.

United States reclaimers increased their purchases of U.S. bottles by 69 million pounds, or 5 percent, as compared to 2013. This accounted for 77 percent of all U.S. bottles collected, up from 74 percent in 2013. United States reclaimers also reported supplementing their domestic purchases by importing 177 million pounds of postconsumer bottles or dirty flake, predominantly from Canada, Mexico and Central and South America, an increase over the 149 million pounds imported in 2013. In addition to the bottle volumes as presented in Table 2, domestic reclaimers reported buying 85 million pounds of alternative feedstock, which included postconsumer thermoforms, pre-consumer bottles, postconsumer strapping, and other unprocessed industrial scrap, an increase of nine million pounds over 2013. In total, U.S. reclaimers purchased 1,660 million pounds of PET scrap material.

Reclaimers outside of the U.S. purchased a total of 414 million pounds or 23 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. At 45 million pounds, purchase of U.S. bottles by Canadian reclaimers was virtually flat from 2013's 47 million pounds. Exports to the Far East, predominantly to Chinese buyers, totaled 369 million pounds, down by 53 million pounds as compared to 2013. Exports of the estimated PET bottle fraction of mixed plastic bales were also down slightly year-over-year at 10 million pounds versus 12.5 in 2013.

TABLE 2: Postconsumer Bottles Recycled / Used by Reclaimers

POSTCONSUMER BOTTLES Gross Weight Purchases (MMlbs)	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
A. Purchased by U.S. Reclaimers	631	681	619	641	615	642	776	916	1,135	1,329	1,398
B. Purchased by Exporters*	372	489	653	755	836	802	781	688	582	469	414
C. Total U.S. Material Recycled (A+B)	1,003	1,170	1,272	1,396	1,451	1,444	1,557	1,604	1,718	1,798	1,812
D. Postconsumer Bottle Imports	106	109	97	100	98	98	89	106	114	149	177
E. Total Postconsumer Bottles used by U.S. Reclaimers (A+D)	737	790	716	741	713	740	865	1,022	1,249	1,478	1,575

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

2014 GROSS RECYCLING RATE

Total U.S. Bottles Collected and Sold for Recycling = 1,812 MMlbs

 Total U.S. Bottles Available for Recycling = 5,849 MMlbs = **31.0%**

TABLE 3: Gross Recycling Rates, 2004 – 2014

Year	Total U.S. Bottles Collected (MMlbs)	Bottles on U.S. Shelves (MMlbs)	Gross Recycling Rate
2004	1,003	4,637	21.6%
2005	1,170	5,075	23.1%
2006	1,272	5,424	23.5%
2007	1,396	5,683	24.6%
2008	1,451	5,366	27.0%
2009	1,444	5,149	28.0%
2010	1,557	5,350	29.1%
2011	1,604	5,478	29.3%
2012	1,718	5,586	30.8%
2013	1,798	5,764	31.2%
2014	1,812	5,849	31.0%

PET BOTTLE BALE MARKETS

PET bottle bale pricing in the U.S. in 2014 was remarkably stable. Early in the year, East Coast average bale prices were up over those of late 2013, falling slightly in the second quarter and remaining stable through the third quarter of the year. Fourth quarter declines reflected a combination of market factors including falling oil prices and strong global virgin PET supply, as well as a softening of Asian and other global economies.

On the West Coast, 2014 bale pricing, delivered pier, averaged at \$.25 to \$.26 per pound throughout much of the year, with fourth quarter declines reflecting similar market factors to those mentioned above. These factors also contributed to a reduction in PET bale exports out of California ports. In addition, West Coast ports had been somewhat congested throughout 2014, a situation that worsened late in the year due to persistent contract negotiation issues.

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

2014	LOW	HIGH
JANUARY	0.15 / pound	0.19 / pound
FEBRUARY	0.16	0.20
MARCH	0.17	0.24
APRIL	0.19	0.24
MAY	0.18	0.23
JUNE	0.16	0.22
JULY	0.16	0.20
AUGUST	0.16	0.20
SEPTEMBER	0.16	0.20
OCTOBER	0.16	0.20
NOVEMBER	0.15	0.19
DECEMBER	0.14	0.18

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 2014, there were 27 U.S. PET reclamation plants in operation, with a combined annual capacity of 2,220 million pounds, gross weight input. By year’s end, there remained 27 plants operating in the U.S. with total annual capacity up to 2,385 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 2014 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 70 percent, down from 2013’s 72 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 2014

Recycled PET (RPET) Production Summary (MMlbs)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
A. RPET Produced by U.S. Reclaimers from U.S. Bottles	505	558	523	496	477	477	558	590	785	974	971
B. RPET Produced by U.S. Reclaimers from Imported Bottles	83	85	69	82	87	84	71	77	84	107	139
C. Total RPET Production U.S. Reclaimers (A+B)	588	643	592	578	564	561	629	667	869	1,081	1,110
D. Clean Flake Equivalent from U.S. Bottles Exported	298	401	529	583	647	601	557	462	396	327	291
E. Total Clean Flake Produced from Bottles in U.S. (A+D)	803	959	1,052	1,079	1,124	1,078	1,115	1,052	1,181	1,301	1,262

PET UTILIZATION RATE

The PET utilization rate is determined by adding the amount of clean flake produced by U.S. reclaimers from U.S. bottle material to the amount of clean flake expected to be produced from exported bottles, both Canadian and all other (assuming average 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

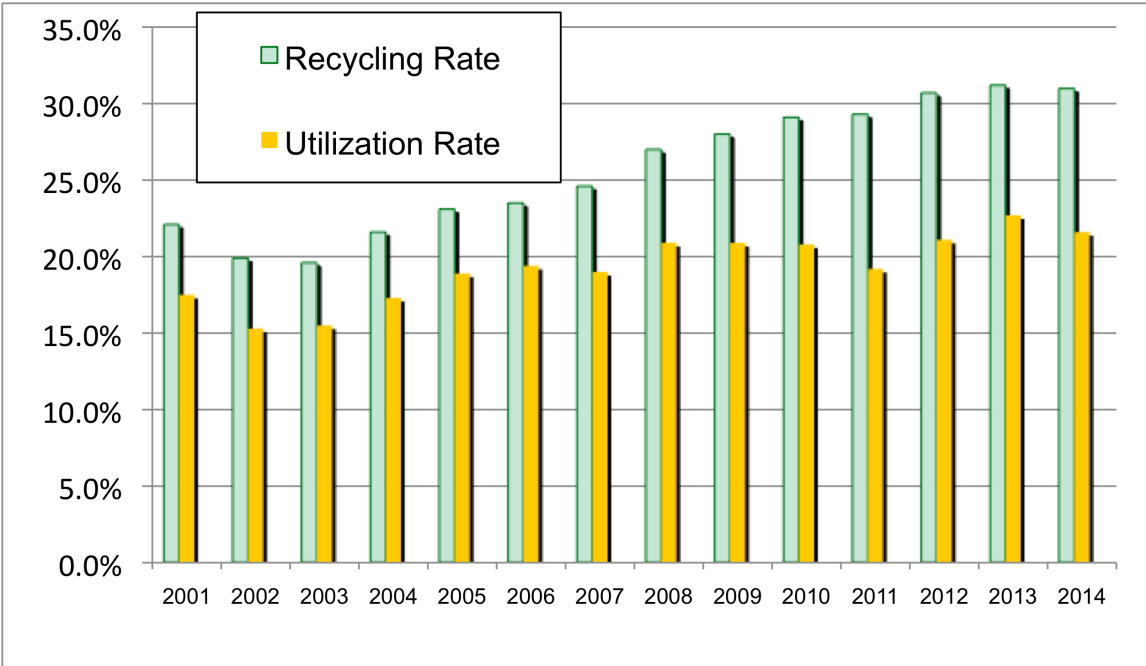


United States reclaimers’ average material utilization rates – calculated by taking reported clean flake produced from U.S. bottle material as a percentage of reported incoming material purchased – were down across the board in 2014, ranging from 73 percent for deposit bottles to 67 percent for curbside material and 74 percent for California CRV. After applying appropriate utilization rates to the export fractions purchased, it was determined that the clean flake equivalent of the 414 million pounds of postconsumer PET bottles exported to all locations was 291 million pounds.

As calculated above, the resulting PET utilization rate was 21.6 percent, down a percentage point from 2013. This is a continuation of the trend observed over the last six years, and illustrated in Table 6, in which we see a widening gap between the amount of PET postconsumer bottle material purchased by reclaimers (the recycling rate) and the amount of clean flake produced (the utilization rate), both taken as a percentage of total PET volumes available for recycling. This is likely the result of high levels of non-PET contamination in curbside bales and, to a lesser extent, in other incoming materials.

It is important to note that material utilization rates are not a direct reflection of bale yields. The report methodology uses survey-derived data of the aggregated volumes of recycled PET container material inputs, including both whole bottles and dirty flake, at the point of reclaimer purchase. Clean flake production is reported on the basis of flake sold in the calendar year. As a result, the utilization rate could reflect production from materials that were already in inventory as the year began, and thus reported as inputs in 2013.

TABLE 6: PET Recycling & PET Material Utilization Rates



Poor PET bale quality, particularly from curbside sources, continues to plague the reclaiming industry with high costs and operational challenges. In late 2014, concern intensified as low virgin resin prices put pressure on RPET markets and narrowed reclaimer margins.

TABLE 7: PET Utilization Rate

Year	Clean Flake Equivalent from Bottle Material <i>(MMlbs)</i>	Bottles on U.S. Shelves <i>(MMlbs)</i>	Utilization Rates
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%
2014	1,262	5,849	21.6%

2014 RPET MARKET

Recycled PET use in domestic end markets increased over 2013, with total converter consumption at 1,564 million pounds across all product categories (see Table 8).² This is the highest figure to date and reflects another increase in this multi-year upward trend. This figure includes all material sources, with U.S. and Canadian reclaimers and “upgraders” (companies that purchase dirty flake, have it toll washed, then pelletize or solid-state it for re-sale) supplying about 1,429 million pounds of flake and pellet produced from all sources of feedstock. The remaining 135 million pounds of recycled PET was imported from reclaimers in countries including Mexico, Taiwan, Brazil, Peru and others in Central and South America. Not counted in these totals, United States and Canadian reclaimers also sold 71 million pounds of PET byproducts to secondary markets.

Top end market growth areas in 2014 included Fiber and Sheet & Film, which increased 14 and 16 percent respectively over 2013 levels. Total RPET used in packaging

² 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.

applications totaled 773 million pounds, down about two percent from 2013. The dramatic resurgence of the U.S. polyester fiber industry is reflected in the increased use and demand in all fiber segments and applications, but particularly strong in automotive and carpet. As in years past, 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 are included in end use categories totals below; they were also up overall, with particular growth in sales to North American fiber and strapping producers.

TABLE 8: RPET used by Product Category (MMlbs)

Product Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 ³	2014
Fiber	479	463	422	383	391	344	381	398	512	558	638
Sheet & Film	58	71	74	128	153	159	195	202	307	315	365
Strapping	116	131	132	144	137	114	127	120	136	140	126
Engineered Resin	12	8	9	11	7	10	9	See Other	See Other	See Other	See Other
Food & Beverage Bottles	126	115	139	136	141	203	216	242	276	425	351
Non-Food Bottles	63	63	49	60	55	65	58	57	50	50	57
Other	24	13	30	38	31	42	16	21	31	25	27
TOTAL CONVERTER CONSUMPTION	878	864	855	900	915	937	1,002	1,040	1,312	1,513	1,564

2014 YEAR-END SUMMARY

The following summary highlights the key trends related to postconsumer PET recycling in 2014:

Demand for recycled PET is strong: significant end-use markets, including Fiber, Sheet & Film, and Non-Food Bottles saw increases in their use of recycled PET in 2014, illustrating solid domestic demand for this material. These increases more than offset declines in other sectors. This solid recycled PET demand is the underpinning of a robust and resilient reclaiming industry that stands at the ready to accept more material, should collections increase. In the interim, reclaimers will likely continue to creatively source non-bottle materials, and rely on imports to some extent.

Supply quality and quantity remain major concerns: The crisis-level contamination levels reported by reclaimers in prior years persisted in 2014, particularly in curbside

³ The Food & Beverage and Non-Food Bottles converter consumption volume splits for 2013 have been corrected in this 2014 report to reflect a data error discovered in 2014. Total converter consumption volume for 2013 was not affected.

PET bales. To address these concerns, NAPCOR and APR collaborated to develop new model PET bale specifications that incorporate bale grading to provide an incentive for suppliers to reduce non-PET content in PET bales. The specifications were issued with a bale grading test protocol to offer a consistent method for bale quality evaluation. With regard to quantity, 2014 saw only a minimal increase, which barely kept pace with the increased supply of bottles available for recycling to maintain a 31 percent recycling rate. The amount of bottles collected domestically does not meet the current demand for RPET and limits growth in this sector. As noted above, to meet demand, reclaimers are increasingly relying on alternative sources of materials, including imports and non-bottle PET.

Thermoform packaging recycling is on the rise: the 70 percent increase in the amount of thermoforms collected for recycling in 2014 demonstrates that the efforts of NAPCOR and its partners to open recycled PET markets to thermoforms is paying off. While acceptance of thermoforms in the PET bottle bales is not yet standard practice, an increasing number of reclaimers are adjusting their specifications to allow for a set percentage of PET thermoforms in bottle bales, or accepting thermoforms in bottle bales from preferred suppliers with auto-sort capabilities.