Report on

Postconsumer PET Container Recycling Activity in 2016

October 31, 2017

NAPCOR

www.napcor.com

The Association of Plastic Recyclers

www.plasticsrecycling.org

ACKNOWLEDGEMENTS

2016 marks the twenty second year that the National Association for PET Container Resources (NAPCOR) has issued this report, and the twelfth year that NAPCOR and The Association of Plastic Recyclers (APR) have worked together to produce it. This report would not be possible without the APR's support and the cooperation of its members and NAPCOR's. Information contained in this report was obtained through surveys conducted by NewGen Strategies & Solutions and More Recycling, and from data generated internally by NAPCOR. Support was also provided by Resource Recycling Systems (RRS). 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.

ABOUT THE SPONSORS

Founded in 1987, the **National Association for PET Container Resources (NAPCOR)** is the trade association for the PET plastic packaging industry in the United States, Canada and Mexico. NAPCOR is dedicated to promoting the PET package; to overcoming hurdles to the successful recycling of PET; and to communicating the attributes of the PET container as a sustainable package. More at www.napcor.com.

The Association of Plastic Recyclers (APR) is the "Voice of Plastics Recycling™." As the international trade association representing the plastics recycling industry, membership includes independent recycling companies of all sizes, processing numerous resins, as well as consumer product companies, equipment manufacturers, testing laboratories, organizations, and others committed to the success of plastics recycling. APR advocates the recycling of all plastics. Visit www.PlasticsRecycling.org for more information.

SUMMARY

This report 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 (US) during 2016, and a general summary of the recycling of PET thermoforms.

In 2016, approximately 6,172 million pounds of PET bottles were sold into the marketplace in the US. About 28.4 percent of those—1,753 million pounds—were collected through recycling programs and sold, either to domestic or foreign markets. PET reclaimers in the US supplemented those bottles collected in the US with imported materials and alternative feedstocks to process a total 1,526 million pounds of material. A variety of end users in the US, led by producers of fiber, consumed the clean RPET flake produced by US reclaimers, as well as imported RPET from Canada and other countries.

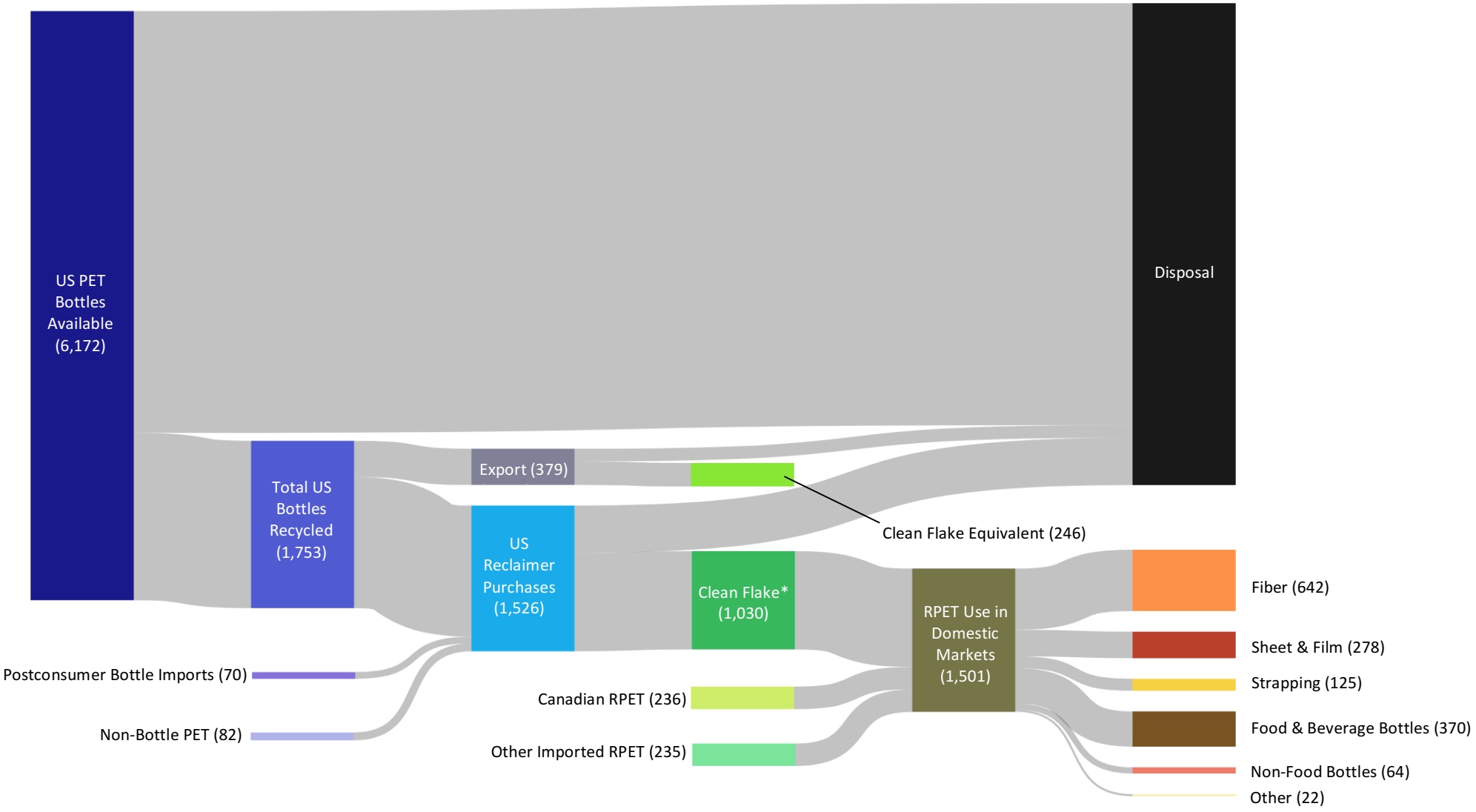
PET material flows in the US are depicted in Figure 1. This report uses color coding to aid readers in following material flows throughout the report; a color reference guide is provided in Appendix A. Comparative historical data is provided in Appendix B.

PET BOTTLES AVAILABLE FOR COLLECTION

The total weight of PET bottles and jars available in the United States for recycling in 2016 was 6,172 million pounds, more than a three percent increase over 2015. This number reflects the total amount of PET resin used by US bottle manufacturers from US, foreign, and recycled sources, with adjustments for scrap generated and not reused in bottles, exported bottles and pre-forms, and bottles less than eight ounces in size. This 6,172 million pounds serves as the denominator in this report to determine both the recycling and material utilization rates; it includes 381 million pounds of postconsumer PET recyclate.

Various market factors affected the volume of PET bottles available for recycling collection in the US in 2016. Negatively affecting market demand was the continued decline in carbonated soft drink sales. This was counteracted by significant growth in the bottled water sector, as well as in other beverage categories, including teas, sports drinks and juices. Also contributing to market growth was some conversion from other resins into PET, particularly in household goods and health and beauty sectors. In terms of general packaging trends, some reduction in single-serve pack sizes continues, with brands looking to meet consumer preferences and diversify their offerings. Light-weighting has leveled off in large part, with some exceptions in new designs for hot-fill PET packaging applications. The availability of low-priced virgin PET resin also played a role in PET package growth in 2016.

FIGURE 1: PET Material Flows in the US (*MMlbs)*



* This total represents all clean flake sold into end markets by US reclaimers. See figure 7 for detail on total flake produced by US reclaimers from bottles.

POSTCONSUMER PET BOTTLE PURCHASES

The total amount, by weight, of postconsumer PET bottles collected for recycling in the United States and sold to recycling markets in 2016 was 1,753 million pounds. The breakdown of this total, by purchaser, is as follows:

TABLE 1: Recycling Rate Numerator

1,374	Purchased by US Reclaimers
363	Purchased by Export Markets
16	PET bottle component of mixed bales exported
1,753	**Total Postconsumer Bottles *(MMlbs)***

This represents a 44 million pound, or 2.4 percent, decrease in total volume of bottles collected as compared to 2015. Because bottles collected decreased in 2016, while the volume of bottles available for recycling increased, the PET recycling rate dropped by approximately two percent to 28.4.

The decrease in collection volumes in 2016 appears to be the result of a drop in deposit volumes outside of California and in PET collected at curbside. Contrary to trends in other deposit states, the amount of material collected through the California CRV program increased slightly. The drop in deposit redemption outside of California marks the continuation of a trend noted in previous reports, and is likely the result of the ongoing decline in market share for carbonated soft drinks (CSD), the predominant category in most state deposit programs.

The decline in curbside collection volumes of PET in 2016 marks the end of a period of slow, steady growth. Curbside volumes had trended up for the few years leading up to, and including, 2015. Several factors across the material

PET Thermoform Recycling

In 2016, PET thermoform volumes collected for recycling in the US and Canada were not much changed from the 88.5 million pounds collected in 2015, coming in at 85.7 million pounds. The overall decline was attributable to a slight reduction in U.S. domestic collections.

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 6) and "flake produced from all sources" total cited on page 13.

The flattening of PET thermoform recycling is connected to the ongoing market challenges mentioned throughout this report. Combatting quality and RPET production margin issues, reclaimers are reluctant to embrace non-preferred material like PET thermoforms. While PET thermoforms are technically recyclable with PET bottles, they are not yet a preferred material from a performance and yield perspective. This remains due in part to concerns that PET thermoforms bring with them potential "look-alike" contamination: PET thermoforms can be hard to distinguish from OPS, PVC, PETG or PLA. In addition, non-recycling friendly inks, labels and adhesives used on thermoforms can affect the quality of recycled material, as can the variability of the material properties of the diverse PET thermoform stream.

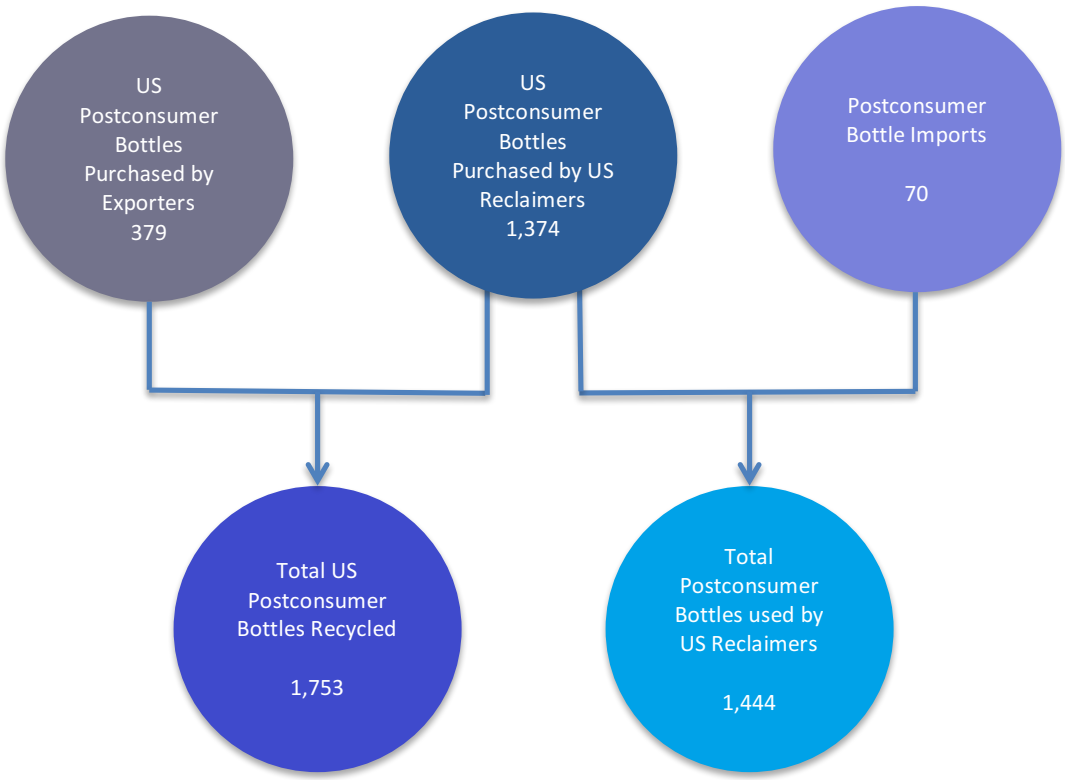
Despite these challenges, some PET reclaimers continue to process PET thermoforms with their PET bottles. Recycling programs and MRFs interested in marketing PET thermoforms should talk to their buyers about market opportunities and best practice guidelines. NAPCOR continues its work to better understand and address market concerns, with a goal of overcoming the obstacles preventing large-scale PET thermoform recycling.

flow chain likely contributed to reductions in curbside PET collection in 2016, a notably difficult year for recycling collectors and processors, generally, and even more so for those in the PET industry. In late 2015, PET bale prices fell to between five and nine cents per pound; bale prices remained low throughout the first quarter of 2016, likely pushing some of the smaller commercial collectors to reduce or eliminate recycling collections. Lower bale prices also may have contributed to less attention to MRF best practices, and as a result, more misdirection of PET bottles in single stream MRFs to paper or residue streams.

Meanwhile, the make-up of the PET bales themselves continued to evolve with changes in PET packaging and applications (e.g., labels, metal components, color, or other performance or decorative features). Not all of this material is of equal value to reclaimers, so some of it may be pulled out at the MRF in order to meet reclaimer specifications. Thus, material that Americans intended to recycle may never make it to a PET bale, potentially diminishing the recoverable (and measured) portion of the total volumes being collected at curbside. Reclaimers had strong incentive to impose stricter quality standards on MRFs by mid-2016, given that their recycled PET production margins were squeezed by increasing bale costs on the raw material supply side and continued low virgin resin prices to meet or beat on the RPET sales side.

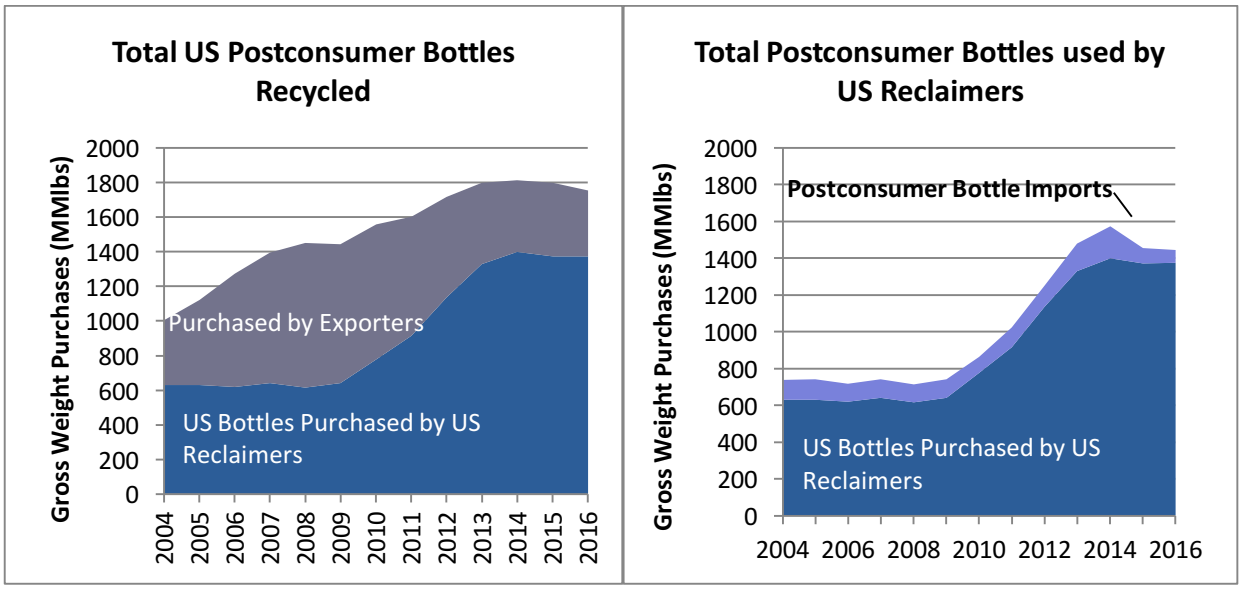
United States reclaimer purchases of US bottles was virtually flat at 1,374 million pounds, up by one million pounds over 2015. Total US purchases accounted for 78 percent of all US bottles collected, just above the 76 percent reported in 2015. United States reclaimers also reported supplementing their domestic purchases by importing 70 million pounds of postconsumer bottles or dirty flake, predominantly from Canada and Mexico, as compared to the 82 million pounds imported in 2015. In addition to the bottle volumes as presented in Figure 2, domestic reclaimers reported buying 82 million pounds of alternative feedstock, which included postconsumer thermoforms, pre-consumer bottles, postconsumer strapping, and sheet. This represents a slight decrease compared to the 93 million pounds of alternative feedstock purchased in 2015. In total, US reclaimers purchased 1,526 million pounds of PET scrap material.

FIGURE 2: Postconsumer Bottles Recycled & Used by Reclaimers



Reclaimers outside of the US purchased a total of 379 million pounds or 22 percent of total US bottles collected. This is the lowest export percentage of total collections since 2000. The purchase of US bottles by Canadian reclaimers dropped to 68 million pounds, down from 75 million in 2015. PET bottle bale exports to the Far East, predominantly to Chinese buyers, totaled 295 million pounds, down by 40 million pounds as compared to last year. Exports of the estimated PET bottle fraction of mixed plastic bales rose slightly to 16 million pounds versus 14 in 2015.

FIGURE 3: Postconsumer Bottles Recycled & Used by Reclaimers



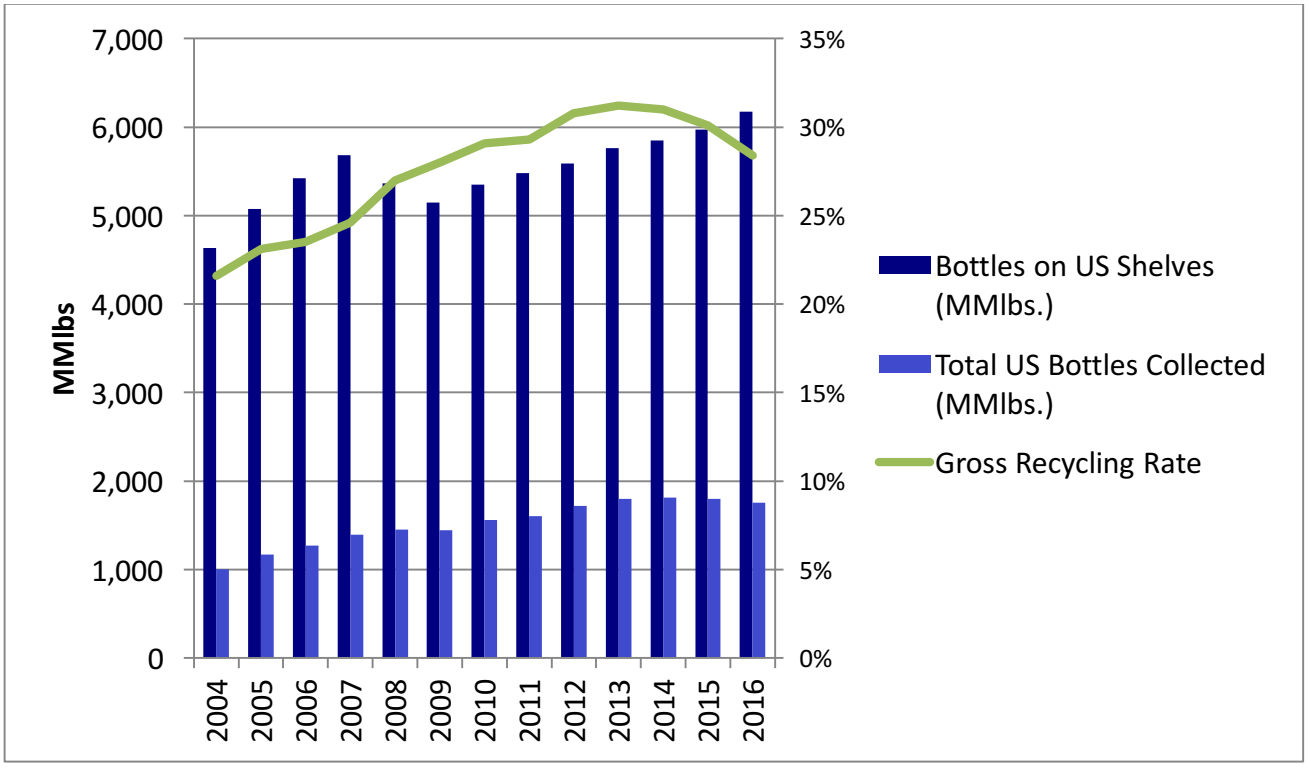
2016 GROSS RECYCLING RATE

Total US Bottles Collected and Sold for Recycling = 1,753 MMlbs

Total US Bottles Available for Recycling = 6,172 MMlbs

= **28.4%**

FIGURE 4: Gross Recycling Rates, 2004 – 2016

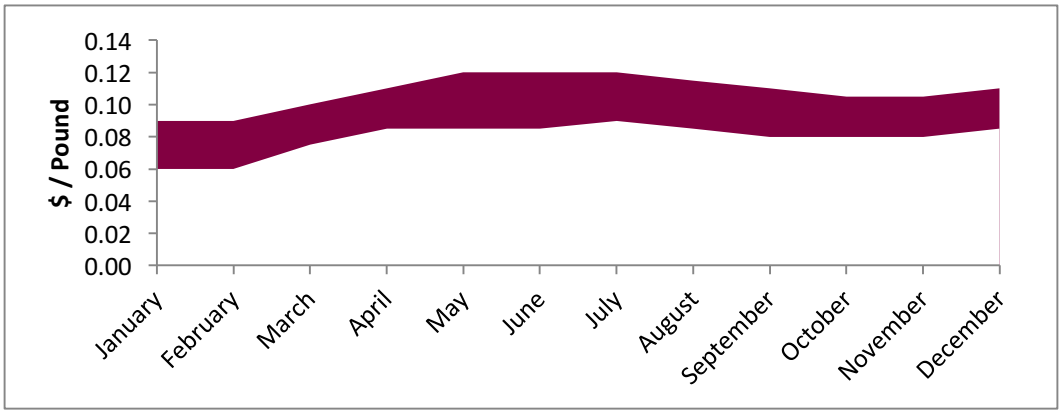


PET BOTTLE BALE MARKETS

From fourth quarter 2015 lows of between $.05 and $.09 per pound, PET bottle bale prices increased through July of 2016, reaching a low / high average range of $.09 to $.12 in July before declining slightly through the end of the year (Figure 5). Low bale pricing early in the year reflected lackluster US and foreign markets and put pressure on MRFs and other intermediate processors trying to cover their costs to collect and bale material. As bale prices strengthened during the year, it was PET reclaimers' turn to feel the squeeze between raw material costs and low virgin resin prices.

On the West Coast, base pricing for high quality (Grade A) California baled PET material, delivered pier, averaged in the $.15-.17 per pound range throughout the first half of the year, hovering in the high $.17's and low $.18's from July through the end of the year. This price represents a Grade A average and is driven to a large extent by the export market. Domestic reclaimers often paid a bit more to secure material, and certainly experienced the margin pressures described above. Lower grade California curbside or curbside/CRV blend material average approximately $.06 per pound below Grade A.

FIGURE 5: East Coast, Non-Deposit PET Bottle Bale Prices
(Monthly Average Low / High Range - Picked Up, Truckload Quantities, Seller's Dock)



RECLAMATION CAPACITY[1]

Many PET reclaimers report that 2016 was one of the most challenging years— in terms of processing, operations and margins—since the birth of the industry in the 1980's. Tight margins, driven down by low virgin resin prices, put significant pressure on PET reclaimers and not all were able to withstand it. At the beginning of 2016, there were 28 US PET reclamation plants in operation, with a combined annual capacity of 2,495 million pounds, gross weight input. By year's end, there were 21 plants operating in the US with total annual nameplate capacity of 2,080 million pounds.

Fluctuations in total reclaimers and capacities is normal, but the extent of the fluctuation in 2016 was unusual. One new plant began operations during the second half of the year, while eight plants of various sizes were either shuttered or closed. Shuttered plants are those whose wash line assets were not in use, but were not dismantled or sold (closed). These plants could potentially resume reclaiming operations, but are not included in the operating plant totals, and none have resumed operations to date. The 21 operating plants continued to employ a wide range of technologies, with 13 of the 21 able to produce Food and Drug Administration (FDA) Letter of No Objection (LNO) direct-contact recyclate suitable for food and beverage packaging use.

The 2016 US reclaimer plant utilization rate—total throughput, based on the use of all PET feedstock, expressed as a percentage of total plant capacity—was approximately 73 percent at the end of 2016. Not surprisingly in light of the capacity reduction, this was up from 62 percent as reported at the end of 2015.

[1] 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; all known US operations are included in NAPCOR's inventory regardless of size.

FIGURE 6: Production of PET Flake from Bottles

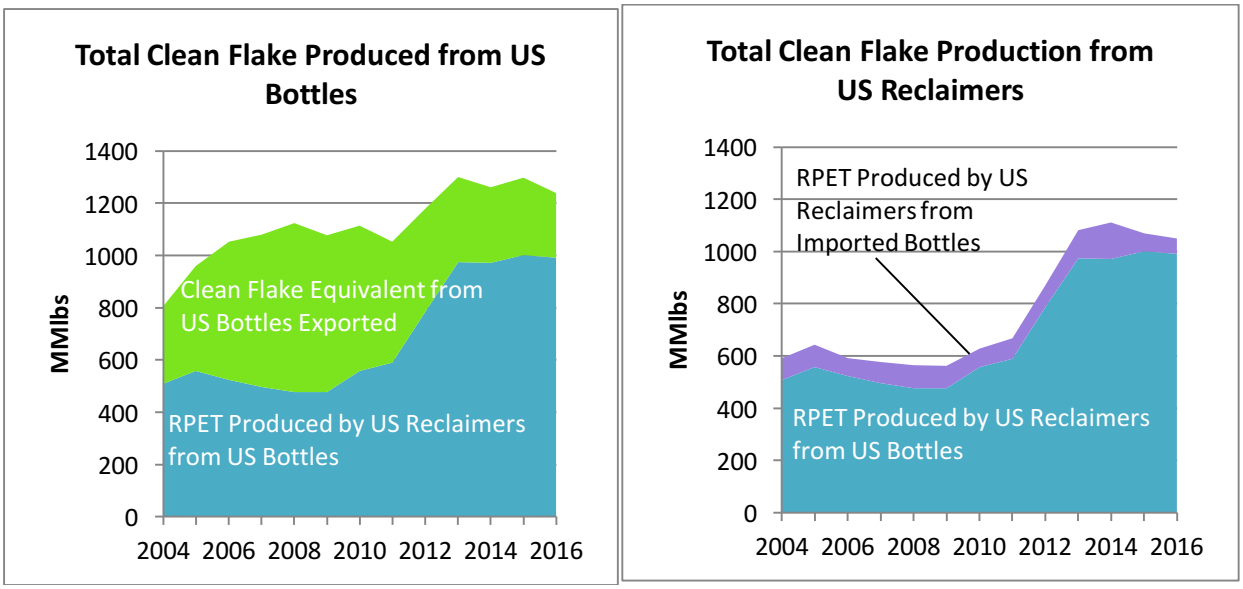
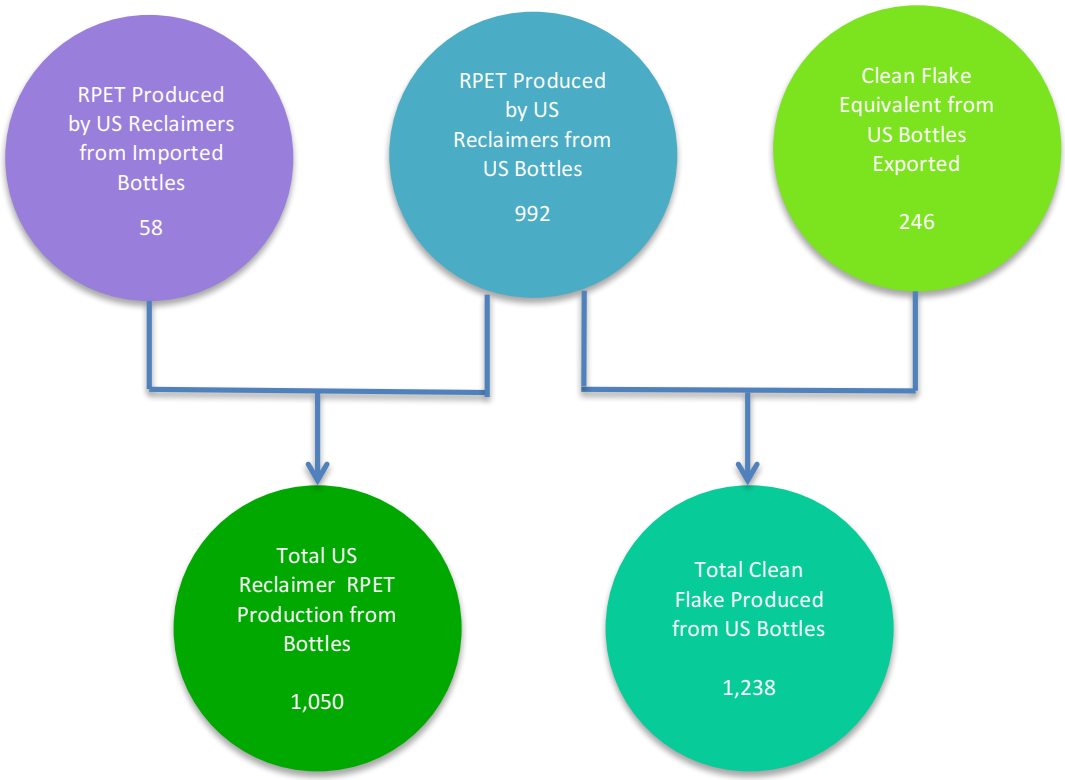


FIGURE 7: PRODUCTION OF PET FLAKE FROM BOTTLES



PET BOTTLE MATERIAL UTILIZATION RATE

The PET bottle material utilization rate is determined by adding the amount of clean flake produced by US reclaimers from US bottle material to the amount of clean flake expected to be produced from exported bottles; the sum is expressed as a percentage of total US bottles available for recycling. The PET bottle material utilization rate is an expression of material and system efficiency—how much usable end product (clean flake) reclaimers were able to produce from incoming material purchased. It is presented alongside the recycling rate, and accounts for processing waste and other yield loss trends year-over-year (Figure 8).

It is important to note that bottle utilization rates are not a direct reflection of bale yields for a given calendar year for several reasons. First, the report methodology uses survey-derived data of the aggregated amounts of recycled PET bottle material inputs, including both whole bottle bales and dirty flake, at the point of reclaimer purchase for the calendar year. Clean flake production is reported on the basis of flake produced in the calendar year. As a result, the utilization rate could reflect production from materials that were already in inventory as the year began. Second, if reclaimers report higher proportions of dirty flake purchased in a given year, this too can disproportionally affect the utilization rate since dirty flake material generally contains fewer contaminants than bottle bales.

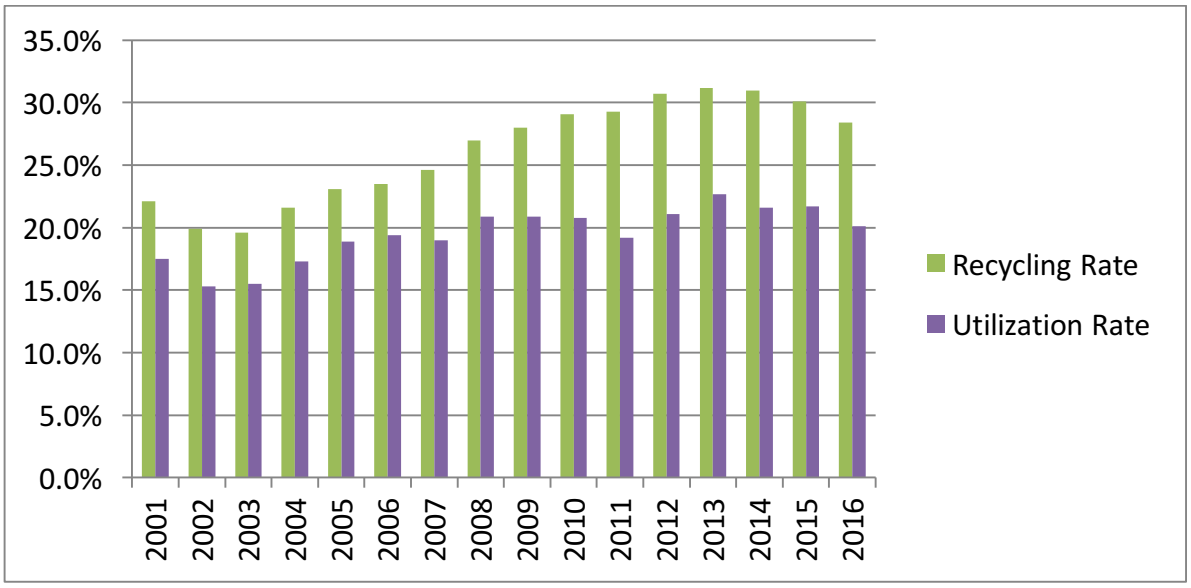
PET Bottle Material Utilization Rate

As diagramed above, after applying estimated production rates to the export fractions purchased, NAPCOR determined that the clean flake equivalent of the 379 million pounds of postconsumer PET bottles exported to all locations was 246 million pounds. Adding this to the total flake produced in the US from US bottles from all collection sources, the resulting PET utilization rate was 20.1 percent, almost two percent below the 21.7 percent reported in 2015. This year's utilization rate shows a continuation of the trend of the last several years (illustrated in Figure 8) marked by a significant gap between the amount of PET postconsumer bottle material purchased by reclaimers (the recycling rate) and the amount of clean flake produced (the bottle material utilization rate). This continues to reflect multiple factors: non-PET contamination in curbside bales; the prevalence of smaller, lighter containers, requiring

more processing and related loss per pound of material; and ongoing design for recyclability issues creating a greater percentage of less marketable, harder-to-process PET. Design for recyclability concerns include labels that are difficult-to-remove or separate from PET or that block autosort function; barrier layers added to PET to preserve product integrity and extend shelf-life; and metal integrated into PET packages, whether in closures, closure rings, can tops, or pump springs.

NAPCOR also calculates United States reclaimers' average production rates by collection source—taking reported clean flake produced from US bottle material in three major collection categories as a percentage of reported incoming material purchased in that category. This is akin to a yield calculation, but should be considered a general indicator for the same reasons mentioned above. In 2016, the production rate for deposit bottles was 85 percent; for curbside, it was 66 percent; and for California CRV material, 81 percent.

FIGURE 8: PET Recycling & PET Material Utilization Rates



2016 RPET MARKET

Combined end market totals increased more than five percent in 2016 as compared to 2015, with total converter consumption at 1,501 million pounds across all product categories (see Figure 9).[2] This figure includes all material sources, with US and Canadian reclaimers and "upgraders" (companies that purchase dirty flake, have it toll

[2] Since the 2009 report, the RPET end-use data reflected in Figure 9 has reflected RPET consumption by converters in both the US and Canada.

washed, then pelletize or solid-state it for re-sale) supplying about 1,266 million pounds of flake and pellet produced from all sources of feedstock. The remaining 235 million pounds of recycled PET was imported from reclaimers in countries including Mexico, Peru, Ecuador, Indonesia, Thailand, and others in Central and South America. Not counted in these totals, United States and Canadian reclaimers also sold 37 million pounds of PET byproducts to secondary markets.

Looking at total use of RPET in specific domestic market segments—both domestically produced and imported—both Food & Beverage Bottle and Non-Food Bottle usage were up by between 5.5 and 6.5 percent for a combined total of 434 million pounds. RPET use in Film/Sheet category was down by 20 percent, likely attributable to competitively priced virgin resin alternatives. This brought total use of RPET in all packaging applications to 712 million pounds, down six percent as compared to 2015. Both fiber and strapping sectors saw considerable growth, up 20 and 19 percent, respectively, over 2015. Fiber sector growth is attributable to an increase in both US and Canadian-produced RPET going to fiber markets, but was also driven by a dominant share of RPET imports. US RPET sales to domestic converters totaled 1,030 million pounds, and while down by 14 million pounds over 2015, sales to all end market categories were up, except for Film/Sheet. Canadian RPET total sales were up to 236 million pounds from 202 in 2015, and also showed increases in all end market categories but Film/Sheet.

FIGURE 9: RPET used by Product Category *(MMlbs)*

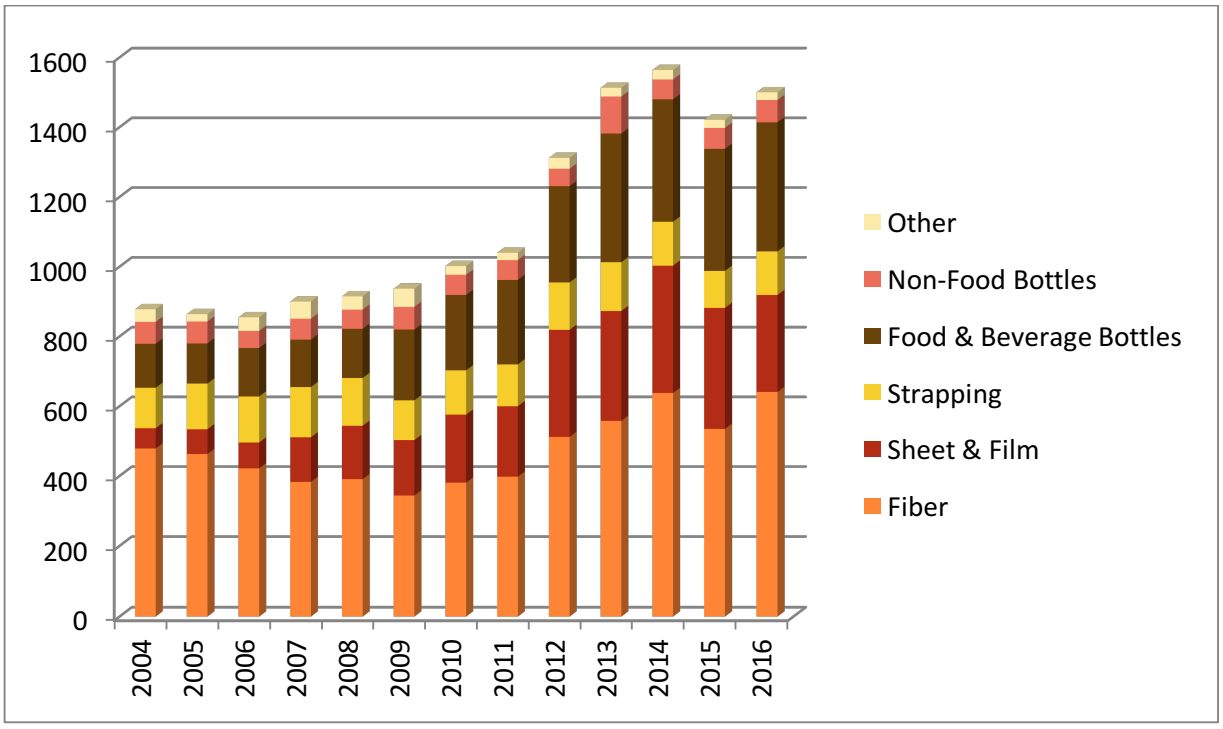
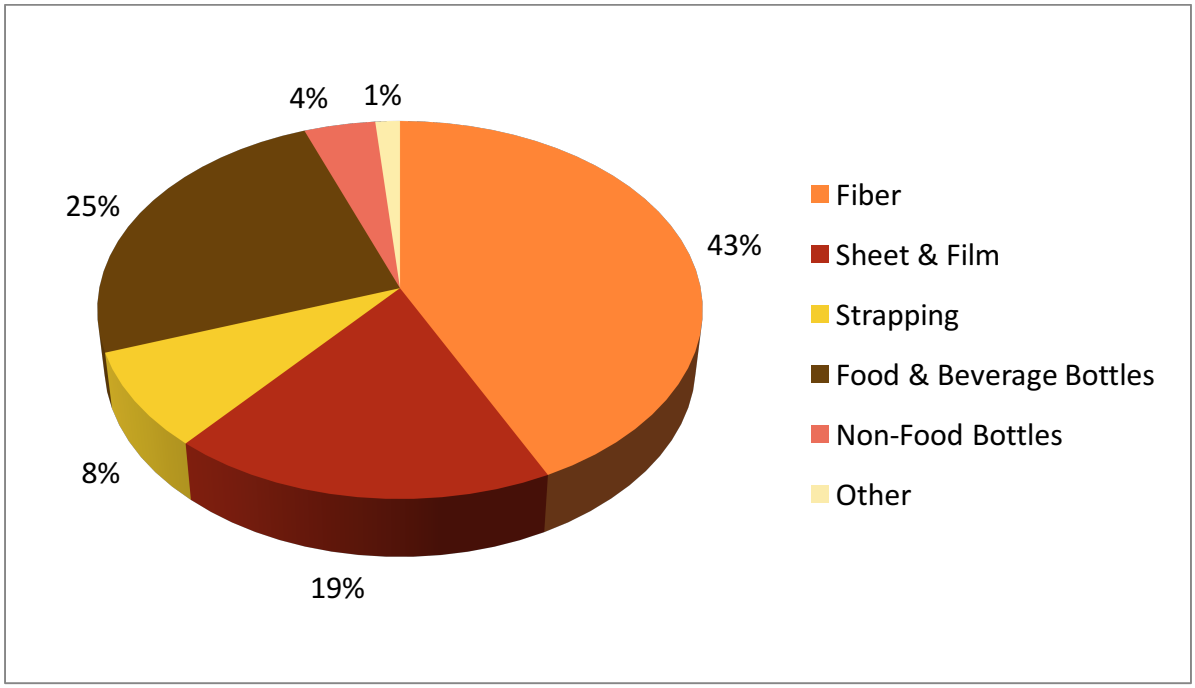


FIGURE 10: RPET used by Product Category in 2016 *(MMlbs)*



2016 YEAR-END SUMMARY

The following summary highlights the key trends related to postconsumer PET recycling in 2016:

Market conditions put extreme pressure on PET reclaimers in what was described by many as the worst year in their history. In 2016, virgin PET resin prices hit historic lows, driving down what buyers were willing to pay for RPET; meanwhile, bale prices trended up from their end-2015 lows. Reclaimer margins were squeezed and not all survived. As a result, the US lost 400 million pounds of PET reclamation operating capacity.

RPET end market demand was consistent in bottle, fiber and strapping markets, though low virgin resin prices put pressure on RPET pricing and reclaimer margins. Demand fell off significantly in the Sheet/Film category, likely due to the price sensitivity of these markets and their ability to use lower specification, lower price virgin PET in place of RPET. RPET end markets increased their use of imported material from Canada and other countries this year, and purchased slightly less US supplied RPET. The domestic PET reclamation infrastructure remains vulnerable to swings in virgin pricing and their impact on end market prices and demand consistency.

The PET curbside stream is changing, affecting both quality and quantity of recoverable material. Despite investments and energy being dedicated to improving curbside programs, material coming through this collection channel decreased for the first time in a number of years. Part of this was no doubt due to the precipitous fall in scrap market pricing in late 2015 / early 2016, causing some attrition in small commercial collections. It's also likely that not all of the diverse stream of PET material collected at curbside made it through the MRF to a PET bale as reclaimers looked to find margin through tighter MRF bale specifications.

Design for recycling is still essential to retain PET bale quality. Core to the continuing decline in PET bottle bale quality is the proliferation of PET packages that are difficult to recycle. Colors, barriers, additives, metal components, and certain labels, inks and adhesives can all increase processing costs and, in some cases, decrease end market material value. During strong markets, these might be tolerable contaminants, but in the very challenging conditions in 2016, they were difficult to overcome.

Thermoform packaging recycling is flat, but ongoing. There were challenges this year with respect to moving the needle on PET thermoform recycling, yet the goal of making these packages as easy to recycle as PET bottles remains in play. The lack of growth in volumes collected in 2016 can be attributed to the pervasive challenges around PET bale quality and a reluctance on the part of some reclaimers to welcome the inclusion of a less-preferred PET material in their bales at this time. That being the case, while including thermoforms in PET bottle bales is not yet acceptable to all reclaimers, it continues to be common practice for many, providing suppliers have auto-sort capabilities, and that best practice protocols to control "look alike" packaging are in place.

Significant vulnerability exists in current system. The challenges and costs involved in producing high-quality RPET from postconsumer material will persist. At the same time, continued efficiencies and production scale will continue to drive PET virgin material costs down.

Appendix A – Color Reference

Used in Material Flow Diagram

- US Bottles Available for Recycling (Denominator)
- Total US Bottles Recycled (Numerator)
- Postconsumer Bottle Imports
- Non-Bottle PET Imports
- US Postconsumer Bottles Purchased by Exporters
- Total Postconsumer Bottles used by US Reclaimers
- Clean Flake Equivalent from Exports
- Clean Flake*
- Canadian RPET
- Other Imported RPET
- RPET Use in Domestic Markets
- Disposal

End Markets

- Fiber
- Sheet & Film
- Strapping
- Food & Beverage Bottles
- Non-Food Bottles
- Other

* This total represents all clean flake sold into end markets by US reclaimers. See figure 7 for detail on total flake produced by US reclaimers from bottles.

Other

- US Postconsumer Bottles Purchased by US Reclaimers
- RPET Produced by US Reclaimers from Imported Bottles
- RPET Produced by US Reclaimers from US Bottles
- Total US Reclaimer RPET Production from Bottles
- Total Clean Flake Produced from US Bottles

Appendix B – Data Tables

TABLE 2: Postconsumer Bottles Recycled / Used by Reclaimers

Gross Weight Purchases (*MMlbs*)

A. Purchased by US Reclaimers

B. Purchased by Exporters*

C. Total US Material Recycled (A+B)

D. Postconsumer Bottle Imports

E. Total Postconsumer Bottles used by US Reclaimers (A+D)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A.	605	549	580	656	588	599	600	522	520	631	681	619	641	615	642	776	916	1,135	1,329	1,398	1,373	1,374
B.	170	148	111	89	183	170	234	275	321	372	489	653	755	836	802	781	688	582	469	414	424	379
C.	***775***	***697***	***691***	***745***	***771***	***769***	***834***	***797***	***841***	***1,003***	***1,170***	***1,272***	***1,396***	***1,451***	***1,444***	***1,557***	***1,604***	***1,718***	***1,798***	***1,812***	***1,797***	***1,753***
D.	46	87	66	101	60	69	70	57	62	106	109	97	100	98	98	89	106	114	149	177	82	70
E.	***651***	***636***	***646***	***757***	***648***	***668***	***670***	***579***	***582***	***737***	***790***	***716***	***741***	***713***	***740***	***865***	***1,022***	***1,249***	***1,478***	***1,575***	***1,455***	***1,444***

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

TABLE 3: Gross Recycling Rates, 1995 – 2016

Year	Total US Bottles Collected *(MMlbs)*	Bottles on US Shelves *(MMlbs)*	Gross Recycling Rate
1995	775	1,950	39.7%
1996	697	2,198	31.7%
1997	691	2,551	27.1%
1998	745	3,006	24.8%
1999	771	3,250	23,7%
2000	769	3,445	22.3%
2001	834	3,768	22.1%
2002	797	4,007	19.9%
2003	841	4,292	19.6%
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%
2015	1,797	5,971	30.1%
2016	1,753	6,172	28.4%

TABLE 4: East Coast, Non-Deposit PET Bottle Bale Prices – Average High / Low
(Picked Up, Truckload Quantities, Seller's Dock)

2016	*LOW*	*HIGH*
JANUARY	$ 0.060 / pound	$ 0.090 / pound
FEBRUARY	0.060	0.090
MARCH	0.075	0.100
APRIL	0.085	0.110
MAY	0.085	0.120
JUNE	0.085	0.120
JULY	0.090	0.120
AUGUST	0.085	0.115
SEPTEMBER	0.080	0.110
OCTOBER	0.080	0.105
NOVEMBER	0.080	0.105
DECEMBER	0.085	0.110

TABLE 5: Production of PET Flake from Bottles in 2015

Recycled PET (RPET) Production Summary (*MMlbs*)

A. RPET Produced by US Reclaimers from US Bottles
B. RPET Produced by US Reclaimers from Imported Bottles
C. Total RPET Production US Reclaimers (A+B)
D. Clean Flake Equivalent from US Bottles Exported
E. Total Clean Flake Produced from US Bottles (A+D)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
A.	496	438	486	513	457	476	476	401	412	505	558	523	496	477	477	558	590	785	974	971	1,001	992
B.	38	70	55	75	47	51	44	46	49	83	85	69	82	87	84	71	77	84	107	139	69	58
C.	***534***	***508***	***541***	***588***	***504***	***527***	***520***	***447***	***461***	***588***	***643***	***592***	***578***	***564***	***561***	***629***	***667***	***869***	***1,081***	***1,110***	***1,070***	***1,050***
D.	153	134	92	75	154	143	184	212	255	298	401	529	583	647	601	557	462	396	327	291	296	246
E.	***622***	***572***	***578***	***588***	***611***	***619***	***660***	***613***	***667***	***803***	***959***	***1,052***	***1,079***	***1,124***	***1,078***	***1,115***	***1,052***	***1,181***	***1,301***	***1,262***	***1,297***	***1,238***

TABLE 7: PET Utilization Rate

Year	Clean Flake Equivalent from Bottle Material *(MMlbs)*	Bottles on US Shelves *(MMlbs)*	Utilization Rate
1995	622	1,950	31.9%
1996	572	2,198	26.0%
1997	578	2,551	22.7%
1998	588	3,006	19.6%
1999	611	3,250	18.8%
2000	619	3,445	18.0%
2001	660	3,768	17.5%
2002	613	4,007	15.3%
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%
2014	1,262	5,849	21.6%
2015	1,297	5,971	21.7%
2016	1,238	6,172	20.1%

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

Product Category	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011[1]	2012	2013[2]	2014	2015	2016
Fiber	292	320	415	417	452	435	344	296	479	463	422	383	391	344	381	398	512	558	638	535	642
Sheet & Film	69	71	89	68	65	37	18	32	58	71	74	128	153	159	195	202	307	315	365	347	278
Strapping	66	58	67	80	101	82	83	77	116	131	132	144	137	114	127	120	136	140	126	106	125
Engineered Resin	24	26	30	26	27	24	10	10	12	8	9	11	7	10	9	See Other	See Other	See Other	See Other	See Other	See Other
Food & Beverage Bottles	24	41	52	68	54	77	86	106	126	115	139	136	141	203	216	242	276	425	351	350	370
Non-Food Bottles	71	53	47	50	40	44	43	24	63	63	49	60	55	65	58	57	50	50	57	60	64
Other	1	1	7	9	5	2	4	7	24	13	30	38	31	42	16	21	31	25	27	23	22
TOTAL CONVERTER CONSUMPTION	**547**	**570**	**707**	**718**	**744**	**701**	**588**	**552**	**878**	**864**	**855**	**900**	**915**	**937**	**1,002**	**1,040**	**1,312**	**1,513**	**1,564**	**1,421**	**1,501**

[1] The Engineered Resins category was folded into "Other" as there was insufficient survey response in this category to meet standard confidentiality guidelines.

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