

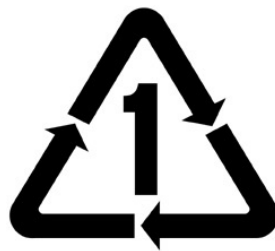


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**The Association of Postconsumer
Plastic Recyclers**

www.plasticsrecycling.org



**2011 REPORT ON POSTCONSUMER
PET CONTAINER RECYCLING ACTIVITY**

FINAL REPORT

INTRODUCTION

2011 marks the seventeenth year that the National Association for PET Container Resources (NAPCOR) has issued this report in its current format, and the seventh 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. It is intended to provide the reader with a detailed overview of the recycling of injection stretch blow molded PET containers in the United States during 2011, and to a lesser degree, 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 the International Bottled Water Association (IBWA). 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, resin producers, bottle manufacturers, public recycling officials, consultants, and key industry members.

PET BOTTLES AVAILABLE FOR COLLECTION

Despite growth in most beverage categories—carbonated soft drinks (CSD) continued to underperform—the total amount by weight of PET bottles and jars sold in the United States (U.S.) during 2011 has still not recovered to 2007 levels. While the number of container units is estimated to have increased by more than 4% in 2011, the amount of PET resin (by weight) used in these containers increased by only 2.4%. This is a result of the continued lightweighting of PET containers in all product categories including not only beverages, but also items like salad dressing containers and nut jars.

NAPCOR determined that the total weight of PET bottles and jars available in the United States for recycling in 2011 was 5.478 billion pounds. This number reflects the total amount of PET bottle resin used by U.S. bottle manufacturers from U.S., foreign, and recycled sources, less scrap generated and not reused, exported bottles and pre-forms, and bottles less than eight ounces in size. We've used 5.478 billion pounds as the denominator in this report to determine both the recycling and utilization rates; it includes 269 MMlbs of postconsumer PET recyclate.

¹ It has become cumbersome to continue to provide all of the historical data, so this report will generally show data for only the last 10 years. Those who are interested in previous reports can access them at 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 2011 was 1,604 million pounds. The breakdown of this total, by purchaser, is as follows:

| | |
|---------|---|
| 916.4 | Purchased by U.S. Reclaimers |
| 628.0 | Purchased by Export Markets |
| 59.6 | PET bottle component of mixed bales exported |
| 1,604.0 | Total Amount of Postconsumer Bottles (<i>MMlbs</i>) |

This represents a 46.8 MMlb increase in total volume of bottles collected over 2010, resulting in an increase in the overall PET bottle recycling rate to 29.3%. There were a number of factors, both positive and negative, that impacted collections in 2011. Contributing to the additional volumes were:

- An increase in the total volume of bottles available for recycling (the denominator);
- An approximate 21 MMlb increase in CRV collections in California;
- A 9 MMlb increase in North Carolina, a result of the landfill ban on plastic bottles;
- New commercial recovery efforts.

This progress was countered by:

- The full impact of lightweighting efforts in all categories of containers;
- A drop in deposit program collections due to lower CSD sales;
- Curtailment or discontinuation of publicly initiated collection programs in various parts of the country due to budget concerns.

United States reclaimers increased their purchases by 140 MMlbs from 2010, an increase of 18%, accounting for 57% of all U.S. bottles collected. Canadian reclaimers increased their purchases by 25% to 55 MMlbs. Export purchases of PET bottle bales, predominantly by Chinese buyers, dropped by 99 MMlbs. Combined with bottles purchased in mixed bales, exports to the Far East totaled 634 MMlbs, or 39.5% of the PET bottles collected. This represents the smallest presence of exporters in the market since 2005 and reflects increased investment in domestic reclamation capacity.

United States reclaimers continued to supplement their domestic purchases by importing 105.8 MMlbs of postconsumer bottles, predominantly from Canada, Mexico and Central and South America. Domestic reclaimers also reported buying 45.8 MMlbs of alternative feedstock, which included 24.9 MMlbs of postconsumer thermoforms, as well as pre-consumer bottles, postconsumer strapping, and other unprocessed industrial scrap. All told, U.S. reclaimers purchased 1,068 MMlbs of scrap material, an increase of 182.3 MMlbs over 2010.

In 2011, PET bottles were again exported as part of both mixed plastic bottle and mixed rigid plastic packaging bale shipments. The two bale types contained different fractions of PET bottles; totals are calculated accordingly and contributed to about 59.6 MMlbs of PET bottles sold in these forms.

| POSTCONSUMER BOTTLES | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <u>Gross Weight Purchases (MMlbs)</u> | | | | | | | | | | | |
| A. Purchased by U.S. Reclaimers | 600 | 522 | 520 | 631 | 681 | 619 | 641 | 615 | 642 | 776 | 916 |
| B. Purchased by Exporters * | 234 | 275 | 321 | 372 | 489 | 653 | 755 | 836 | 802 | 781 | 688 |
| C. Total U.S. Material Recycled (A+B) | 834 | 797 | 841 | 1,003 | 1,170 | 1,272 | 1,396 | 1,451 | 1,444 | 1,557 | 1,604 |
| D. Postconsumer Bottle Imports | 70 | 57 | 62 | 106 | 109 | 97 | 100 | 98 | 98 | 89 | 106 |
| E. Total Postconsumer Bottles used by U.S. Reclaimers (A+D) | 670 | 579 | 582 | 737 | 790 | 716 | 741 | 713 | 740 | 865 | 1,022 |

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

2011 GROSS RECYCLING RATE

Total U.S. Bottles Collected and Sold for Recycling = 1,604 MMlbs

Total U.S. Bottles Available for Recycling = 5,478 MMlbs
= 29.3%

| Year | Total U.S. Bottles Collected (MMlbs) | Bottles on U.S. Shelves (MMlbs) | Gross Recycling Rate |
|-------------|---|--|-----------------------------|
| 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% |

PET BOTTLE BALE MARKETS

A combination of world events, natural disasters, mechanical mishaps and chemical raw material shortages contributed to tight supply and high prices for virgin PET for most of the year. This allowed domestic reclaimers to pay almost record prices for postconsumer bales during the first quarter of 2011, and in the \$.30 (per pound) range or better for most of the remainder of the year. Occasional end users reappeared in the market as RPET provided a cheaper, and in some cases essential, raw material alternative for most applications. For most of the year these conditions also allowed East Coast prices to exceed those on the West Coast, a phenomenon not often seen. Aside from the high ceiling set by virgin pricing, prices were also driven by material needs for a wave of expansions and new plants. All of this contributed to making export buyers less competitive and keeping more material in the U.S. for processing. By the end of the year however, as end users reacted to high prices by cutting back and canceling orders, bale prices plunged. Once again, the market was reminded that recycled PET priced higher than virgin is not sustainable in the long run.

As always, good quality dirty granulate material and deposit bottle bales continued to be in high demand and short supply, commanding a premium over curbside bales of as much as \$.10 per pound.

EAST COAST, NON-DEPOSIT PET BOTTLE BALE PRICES

(Picked Up, Truckload Quantities, Seller's Dock)

| 2011 | LOW | HIGH |
|------------------|----------------|----------------|
| JANUARY | \$0.27 / pound | \$0.35 / pound |
| FEBRUARY | 0.32 | 0.39 |
| MARCH | 0.34 | 0.40 |
| APRIL | 0.36 | 0.40 |
| MAY | 0.32 | 0.38 |
| JUNE | 0.26 | 0.30 |
| JULY | 0.26 | 0.36 |
| AUGUST | 0.28 | 0.36 |
| SEPTEMBER | 0.30 | 0.36 |
| OCTOBER | 0.29 | 0.36 |
| NOVEMBER | 0.22 | 0.34 |
| DECEMBER | 0.14 | 0.25 |

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 2011, there were 19 U.S. PET reclamation plants in operation, with a

combined capacity of 1.380 billion pounds, gross weight input. These plants employed a wide range of technologies, from the rudimentary to systems capable of producing RPET approved for direct-contact food and beverage packaging. By year's end, there were 23 plants operating in the U.S.; their total annual capacity of 1.755 billion pounds exceeds the amount of material collected for recycling in 2011. As referred to above, 12 of these plants can produce Food and Drug Administration (FDA) Letter of No Objection (LNO) direct-contact recycle suitable for food and beverages.

The plant utilization rate for U.S. reclaimers, based on the use of all feedstock, was around 67% for the year. 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.

| Recycled PET (RPET) Production Summary (MMlbs) | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|
| A. RPET Produced by U.S. Reclaimers from U.S. Bottles | 401 | 412 | 505 | 558 | 523 | 496 | 477 | 477 | 558 | 590 |
| B. RPET Produced by U.S. Reclaimers from Imported Bottles | 46 | 49 | 83 | 85 | 69 | 82 | 87 | 84 | 71 | 77 |
| C. Total RPET Production U.S. Reclaimers (A+B) | 447 | 461 | 588 | 643 | 592 | 578 | 564 | 561 | 629 | 667 |
| D. Clean Flake Equivalent from U.S. Bottles Exported | 212 | 255 | 298 | 401 | 529 | 583 | 647 | 601 | 557 | 462 |
| E. Total Clean Flake from U.S. Bottles (A+D) | 613 | 667 | 803 | 959 | 1,052 | 1,079 | 1,124 | 1,078 | 1,115 | 1,052 |

PET UTILIZATION RATE



The PET utilization rate is determined by adding the amount of clean flake produced by U.S. reclaimers, the amount produced by Canadian reclaimers from U.S. bottles, and the amount expected to be produced from exported bottles (assuming U.S. yield losses as detailed below); the sum is expressed as a percentage of total U.S. bottles available for recycling. United States reclaimers reported yield losses ranging from 25% for deposit bottles to 35% for curbside material and 28.9% for California CRV. These contamination levels are higher in all categories than in 2010 and have reached crisis levels according to industry experts. While much of the non-PET material in these bales can be sold off as byproducts, few of these byproducts have value that can offset the original purchase price, not to mention the added costs of processing and the impact on clean flake quality. After applying the yield losses to the various fractions purchased, it was determined that the clean flake equivalent of the 687.6 MMlbs of postconsumer PET bottles shipped export to all locations was 462 MMlbs. As calculated above, the resulting utilization rate was 19.2%, markedly lower than in 2010.

| Year | Clean Flake Equivalent <i>(MMlbs)</i> | Bottles on U.S. Shelves <i>(MMlbs)</i> | Utilization Rates |
|------|--|---|-------------------|
| 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% |

2011 RPET MARKET

Since the 2009 report, the RPET end-use data has reflected RPET consumption by converters in both the U.S. and Canada (see table on page 9). In 2011 as in 2010, Canadian RPET markets continued to improve, particularly for packaging applications; as a result, less RPET was available to U.S. converters from Canadian reclaimers.

Use of RPET in the primary conversion categories in the U.S. and Canada totaled 1,040 MMlbs for 2011, an increase of almost 4%. United States and Canadian reclaimers also sold 78.2 MMlbs of PET byproducts to secondary markets for a total RPET consumption of 1,118 MMlbs. This represents the highest converter consumption figure to date. Of this total, U.S. and Canadian reclaimers supplied about 821 MMlbs of flake and pellet produced from all sources of feedstock, in addition to the 78.2 MMlbs of secondary material. The remaining 219 MMlbs was either provided by U.S. RPET “upgraders” (companies that purchase dirty PET flake, have it toll washed, then pelletize or solid-state it for resale), or imported from reclaimers in countries such as France, Italy, India, Israel, Taiwan, China, Mexico, Brazil, Peru and others in Central and South America.

For the most part, 2011 saw a continued stable and strong demand from most segments of the RPET market, particularly from package converters. However, the big jump in the use of RPET in bottles came from Canadian manufacturers, or bottles made in the U.S. and sold in Canada. Fiber applications also posted a substantial increase in RPET usage that was not entirely expected, particularly as PET staple fiber for carpet is now largely being phased out. However, its replacement, PET bulk continuous filament (BCF), is growing much faster than anticipated and its use of RPET, while more challenging than staple fiber, is also growing more quickly than anticipated. Also, market segments for a wide range of staple, filament and non-woven products remain strong.

This year, the “Engineered Resins” category was folded into “Other,” as there was insufficient survey response in this category to meet standard confidentiality guidelines. Once regarded as the growth market, particularly for green and colored RPET, PET compounds found stiff competition from postconsumer nylon-based compounds that had better performance characteristics. If this situation changes in any substantive way, the Engineered Resins category will be reinstated.

RPET Product Categories
RPET used (MMlbs)

| Product Category | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|--|------------|------------|------------|------------|------------|------------|------------|------------|--------------|--------------|
| Fiber | 344 | 296 | 479 | 463 | 422 | 383 | 391 | 344 | 381 | 398 |
| Sheet & Film | 18 | 32 | 58 | 71 | 74 | 128 | 153 | 159 | 195 | 202 |
| Strapping | 83 | 77 | 116 | 131 | 132 | 144 | 137 | 114 | 127 | 120 |
| Engineered Resin | 10 | 10 | 12 | 8 | 9 | 11 | 7 | 10 | 9 | See Other |
| Food & Beverage Bottles | 86 | 106 | 126 | 115 | 139 | 136 | 141 | 203 | 216 | 242 |
| Non-Food Bottles | 43 | 24 | 63 | 63 | 49 | 60 | 55 | 65 | 58 | 57 |
| Other | 4 | 7 | 24 | 13 | 30 | 38 | 31 | 42 | 16 | 21 |
| TOTAL CONVERTER CONSUMPTION | 588 | 552 | 878 | 864 | 855 | 900 | 915 | 937 | 1,002 | 1,040 |

2011 YEAR-END SUMMARY

Four major factors defined the activities of the postconsumer PET recycling industry in 2011.

Lightweighting: The full effects of bottle lightweighting efforts were felt by all parts of the industry. Collectors, intermediate processors, and reclaimers had to handle more containers to obtain the same weight. Not only has this increased costs, it's created logistical issues in handling the lighter containers throughout the system. The lighter weights further support PET's credentials as the environmentally preferred package, and in the long term the problems will be worked out, but in the near term, lightweighting is an issue. There is general agreement that innovation will continue to reduce package weights, but most observers feel that we have already experienced the largest impacts.

Reclamation Capacity: The U.S. now has capacity to process more postconsumer PET packaging, both bottles and thermoforms, than the amount of PET packaging collected. That means that in 2012, even if no PET bales are exported, these reclamation assets will be short of material. Investments in these assets are substantial (ranging as high as \$50 million) and the assets are arguably the most sophisticated in the world, both in what they can handle and in the quality of RPET they produce (most now have FDA No Objection Letter capacity). Without reclamation plants there is no PET recycling, and these new plants are essential if respectable PET recycling rates are to be achieved. But without additional collection efforts or new streams of material, the increased capacity will only serve to drive prices to unsustainable levels, as too many operations chase too few bottles.

Contamination: As more programs switch to single-stream recycling, it appears to be no coincidence that the quality of PET bales from curbside collection programs continues to deteriorate. This deterioration largely manifests itself as more non-PET material in the bale, but the increase in the amount is not the only concern. As these programs are by definition less selective in what they collect, contaminants not previously seen are now being encountered by PET reclaimers. As previously mentioned, the yield for curbside bales in 2011 was determined to be 65%. The composite data shows an even lower number. After discussion with many reclaimers, the 65% number was determined to be a fair assessment of the PET that is actually recovered from a bale, including non-traditional bottles, even though some may be going to lower-end applications.

The second source of contamination is brand owners who are not following “Design For Recycling” principles and guidelines. Two major problem areas are causing extraordinary yield losses and impacting RPET quality:

- Full-wrap bottle labels that sink in hot water and/or bleed inks during the wash process
- Pressure-sensitive labels, particularly on thermoformed packaging, that cannot be removed or leave too much adhesive residue on the flake after the wash process

NAPCOR urges brand owners to use The Association of Postconsumer Plastic Recyclers (APR) Design for Recyclability guidelines and test protocols (www.plasticsrecycling.org) to determine whether their PET packaging will move efficiently through the system. In addition, the newly released Federal Trade Commission (FTC) “Green Guides” on environmental marketing claims indicate that limitations to the recyclability of a package precludes use of recycling claims or implied claims in many instances.²

Quite simply, these contamination levels are not economically sustainable. Reversing the trend will require a strong, coordinated effort on the part of all stakeholders.

Thermoformed Packaging Recycling: 2011 saw the first significant amount of PET thermoformed packaging moving through the system in both the US and Canada (see addendum, page 11). Since 2009, NAPCOR has made the removal of obstacles to PET thermoform recycling its top priority, not only as a reflection of proper stewardship for PET’s fastest-growing packaging segment, but as a way of increasing feedstock opportunities for reclaimers, and ultimately ensuring more RPET flake and pellet supply to the end-use market. These efforts are now bearing fruit, as all purchasers and processors of curbside bales are allowing some level of thermoforms mixed in with the bottles; accepted levels range as high as 20%. In the short-term, increased PET thermoform collection is the best hope of addressing the key issue of increasing supply.

² Section 260.12(d) of the FTC “Green Guides” states: “If any component significantly limits the ability to recycle the item, any recyclable claim would be deceptive.” <http://www.ftc.gov/os/2012/10/greenguides.pdf>

Addendum: PET Thermoform Recycling

As mentioned above, NAPCOR continued to work in 2011 with public program operators, intermediate processors, reclaimers, and end users to remove obstacles that prevent the recycling of PET thermoformed packages. This effort fostered a much better understanding of the technical and logistical issues involved, and ultimately led to the breakthrough on end-market options for recycled PET thermoform material that occurred in 2011.

According to the 2011 survey responses, all but two reclaimers of curbside bales indicated they were processing thermoforms at levels up to 10%; some were purchasing dedicated bales of 100% PET thermoforms. This totaled 24.9 MMlbs. In addition, Moore Recycling Associates determined that 11.3 MMlbs were exported as part of mixed bales, and other curbside bales exported contained an average of 3% or 8.8 MMlbs. In total, NAPCOR determined that 45 MMlbs of PET thermoforms were recycled in 2011, a small but important beginning.

NAPCOR, with the financial support of SPI and individual NAPCOR members Placon Corporation, Plastic Ingenuity, Inc. and Solo Cup, also issued an RFP to recycling programs in the U.S. interested in creating model PET thermoform recycling programs. Over \$100,000 was awarded to three grantees: Montgomery County, MD; First Star Fibers, Omaha, NE; and the Pennsylvania Markets Development Center, working with rural programs in Elk and Lebanon counties. We believe that these programs will provide models in intermediate processing alternatives and consumer education, and will accelerate the recycling of the PET thermoformed package in the U.S.

NAPCOR would again like to acknowledge the strong support of this effort by Stewardship Ontario, Waste Diversion Ontario, The Association of Postconsumer Plastic Recyclers, the Canadian Plastic Industry Association, and more recently, that of SPI: The Plastics Industry Trade Association, without whose collective assistance the progress achieved to date would not have been possible.