



**Association of Postconsumer  
Plastic Recyclers**



# **2007 UNITED STATES NATIONAL POST- CONSUMER PLASTICS BOTTLE RECYCLING REPORT**

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## **INTRODUCTION**

The 2007 edition of the United States National Post-Consumer Plastics Bottle Recycling Report is the 18<sup>th</sup> annual report on plastic bottle recycling. This study is a cooperative effort between the Plastics Division of the American Chemistry Council (ACC) and the Association of Postconsumer Plastic Recyclers (APR), the goal of which is to quantify the amount of high density polyethylene (HDPE) and polypropylene (PP) bottles recycled, as well as the rate of recycling. This study includes postconsumer recycling values and comments for polyethylene terephthalate (PET) developed by the National Association for PET Container Resources (NAPCOR) and the Association of Postconsumer Plastic Recyclers (APR). The reclaimer survey portion of the study was conducted by the Moore Recycling Associates, Inc.

## **HIGHLIGHTS/SUMMARY FOR 2007**

### **Plastic Bottle Pounds Collected for Recycling in the United States**

- The total pounds of plastic bottles collected increased by 115 million pounds for 2007 over 2006.
- The total pounds of plastic bottles recycled reached a record high 2,335 million pounds.
- The annual increase in pounds of plastic bottles recycled was 5.2%.
- PET bottles collected increased by 124 million pounds.
- HDPE bottles collected decreased by 7.5 million pounds to 920.6 million pounds, reflecting decreases in bottle weight due to light weighting and the shift to using concentrated laundry products.








- Polypropylene bottle recycling totaled 17.6 million pounds.
- Exports of US-collected HDPE bottle material were 23% of domestically collected material with approximately half of the exports going to Canada.

### Plastic Bottle Recycling Overview for 2007

Due to the significant environmental and economic benefits and convenience attributes of plastic packaging, overall bottle resin usage continued to increase, reflecting the continuing conversion of packages to plastic and natural growth in traditional markets. PET virgin resin sales remained strong during this period. HDPE virgin resin sales actually decreased from 2006 to 2007, but the use of recycled HDPE back into bottles kept the total amount of HDPE used for bottles slightly increased for 2007 over 2006. Many new beverage applications are typically consumed away from the home, and therefore, away from conventional recycling bins. The growth of bottles recycled reflects the following:

- Bale prices for recycled bottles remained high through 2007
- Single stream collection of household recyclables continued to grow, generally resulting in higher overall participation rates
- California redemption programs collected not only PET, but also HDPE, PP, PVC, and LDPE bottles

The common plastic bottle resins, as identified by their resin identification codes, are:

	PETE	Polyethylene Terephthalate, PET
	HDPE	High Density Polyethylene, HDPE
	V	Polyvinyl Chloride, PVC
	LDPE	Low Density Polyethylene, LDPE
	PP	Polypropylene, PP
	PS	Polystyrene, PS
	OTHER	Other

PET and HDPE bottles continue to comprise over 96% (96.3%) of the plastic bottle market and over 99% (99.2%) of the bottles recycled. The largest market share of the other resins used to make bottles is held by polypropylene at 2.1% of plastic bottles followed by PVC at 0.9% of plastic bottles. Many polypropylene bottles are included with pigmented HDPE bottles for recycling. For this report, an allowance based on buyer reports has been included to account for those polypropylene bottles. So long as the total polypropylene concentration stays below 5% in batches of HDPE recycle, the inclusion is considered benign.

Although the #3 through #7 resins are recyclable, and occasionally are recycled, the actual level of recycling is limited by the continuing challenge to reach a critical mass of readily recognizable bottles for economical collection and processing. However, it should be noted that bottles made from resins #3 through #7 make up less than 4 percent of the plastic bottle market.

Bottles coded bottles with “#7, Other” are not included in this report as a discrete category. Bottles coded #7 may include HDPE or PET or PP with barrier layer materials. These bottles are often recycled with the primary resins used in each container. Bottles coded #7 may also be made from resins other than those listed above. Data are not available on a national basis for bottle resins other than #1-#6 defined above.

## Post-Consumer Plastic Bottle Recycling Collection Results

**Table 1**  
**Post-Consumer Plastics Bottles Recycled in**  
**Calendar Year 2007 Compared to Calendar Year 2006 Results [1,2,3,4,5,6,7]**  
(in millions of pounds per year)

Plastic Bottle Type	Calendar Year 2006			Calendar Year 2007		
	Plastic Recycled [2]	Resin Sales [3,4]	Recycling Rate	Plastic Recycled [2]	Resin Sales [3,4]	Recycling Rate
PET [4]	1272	5424	23.5%	1396	5683	24.6%
HDPE Natural	454.4	1643	27.7%	410.2	1654	24.8%
HDPE Pigmented	473.7	1867	25.4%	510.4	1886	27.1%
<b>Total HDPE Bottles</b>	<b>928.1</b>	<b>3510</b>	<b>26.4%</b>	<b>920.6</b>	<b>3540</b>	<b>26.0%</b>
PVC [5]	0.8	111	0.7%	0.4	86	0.5%
LDPE [5]	0.3	69	0.4%	0.3	68	0.5%
PP [6]	18.4	207	8.9%	17.6	202	8.7%
<b>TOTAL BOTTLES</b>	<b>2220</b>	<b>9321</b>	<b>23.8%</b>	<b>2335</b>	<b>9579</b>	<b>24.4%</b>

[1] These data provide a snapshot of plastic bottle recycling collection trends from the national perspective. The data are particularly useful in identifying national trends and highlighting changes that have occurred from year to year, and may be a useful tool for planning purposes. While national data may be useful as a comparison with local waste characterization and recycling data, significant differences will exist from locality to locality and from state to state. If communities or states are making decisions where precise knowledge of the amount, composition and disposition of MSW is crucial, e.g., where a solid waste management facility is being designed, or for local or state regulatory enforcement, etc., then local characterization of the quantities of individual components generated, recycled and disposed is essential.

[2] Data are based on surveys performed by Moore Recycling Associates, Inc. and include bale composition data provided by Moore Recycling Associates, Inc. and others.

[3] Based on data provided by the American Chemistry Council’s Plastics Industry Producers Statistics Group. HDPE resin sales include both the virgin and recycled plastic pounds used to produce new bottles.

[4] Source: 2007 Report of Post Consumer PET Container Recycling Activity, National Association of PET Container Resources, Sonoma, California

[5] The majority of PVC and LDPE recycled were as part of commingled bottle and container bales

[6] About 1/3 of polypropylene bottles were deliberately recycled as polypropylene bottles, about 1/3 were included in commingled and mixed plastic bales, and about 1/3 were included with colored HDPE

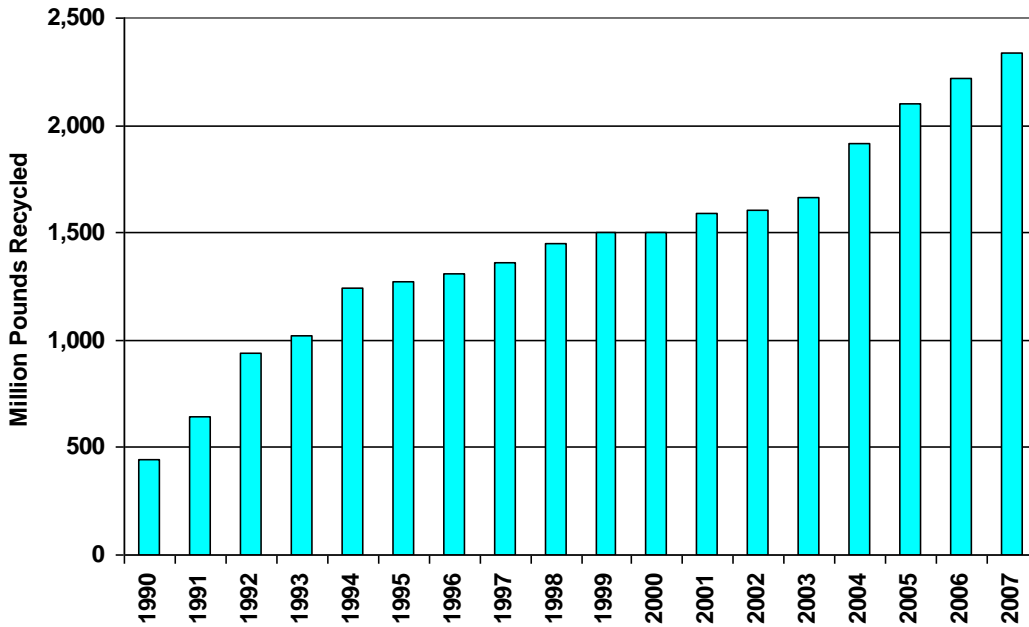
[7] National data for bottles of other resins are not available.

The apparent drop in HDPE natural and increase in HDPE pigmented reflects actual change and methodological change. Many natural homopolymer HDPE milk bottles are

now pigmented and those bottles become included in the usually pigmented copolymer bottles. The split between natural HDPE (presumed to all be homopolymer) and pigmented HDPE (usually presumed to be copolymer) was based on buyer estimates. The “Total HDPE Bottles” values above are probably more accurate numbers.

About 6% of the total #2 through #5 bottles collected were part of commingled bottles bales or mixed rigids bales. For high density polyethylene bottles the contribution from commingled bottles bales and mixed rigids was about 5% of the total HDPE bottles collected. For polypropylene bottles the contribution from commingled bottles bales and mixed rigids was about 37% of the total. For PVC bottles the contribution from commingled bottles bales and mixed rigids was about 97% of the total. For LDPE bottles the contribution from commingled bottles bales and mixed rigids was about 99% of the total.

**Figure 1  
Growth in Post-Consumer Plastic Bottle Recycling**

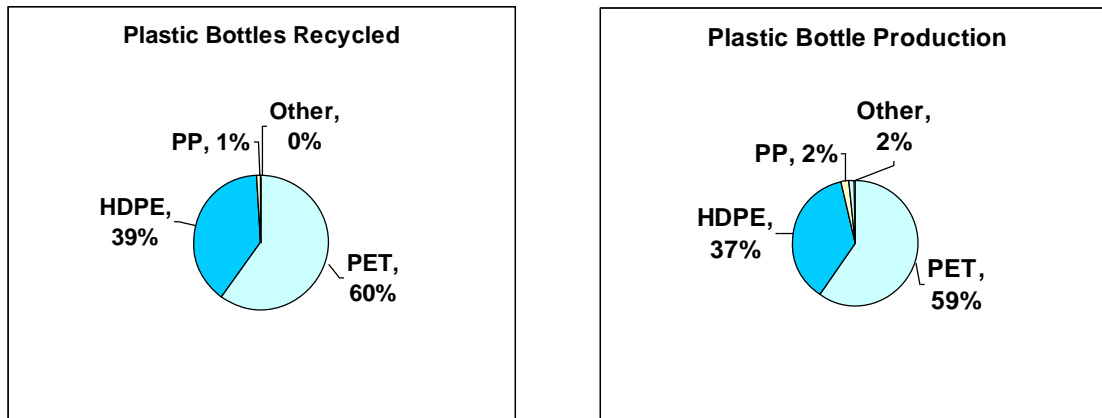


**SOURCE: NAPCOR, all years, for PET. For other bottle resins, R.W. Beck, Inc., 1990-2006; Moore Recycling Associates, Inc., 2007**

The growth in total pounds of postconsumer bottles collected for recycling continued in 2007. A total of 2,335 million pounds of plastic bottles are reported as collected for recycling. The change from 2006 was an increase of 115 million pounds of recycled bottles, or an increase of 5.2%.

The change in total resin used to make bottles was an increase of 258 million pounds, or an increase of 2.8%. About 1/3 of the increased bottle use of plastic was from the growth in the use of post consumer recycled plastic for bottles.

**Figure 2**  
**2007 Plastic Bottles Recycled and Plastic Bottle Production by Resin**



Source: Moore Recycling Associates, Inc. 2007

PET and HDPE continued to dominate as selected resins to produce plastic bottles: 96.3% by weight of produced bottles were made of PET or HDPE. PET and HDPE bottles also continued to dominate the bottles collected for recycling.

### **Barriers to Increased Plastic Bottle Recycling**

As noted for 2005 and 2006, too many consumers continue to be unaware of the significant usefulness, demand, and value of recycled plastic HDPE and PET. Data and experience show that plastic bottle recycling can be increased through sustained local education campaigns. Municipalities also need to understand that they too can benefit from the high prices being paid for bales of bottles, including revenue sharing to fund educational programs and other costs of collection.

Another barrier to increased recycling is lack of sufficient access to recycling collection opportunities for products used away from home. Consumer data continue to show that the public wants additional opportunities to be able to recycle at public venues, offices, recreational sites, schools, and retail establishments.

In 2007 the Association of Postconsumer Plastic Recyclers, with support provided from the American Chemistry Council, conducted workshops and webinars for municipal recycling coordinators to educate them on the existing markets for baled bottles, the strong demand for goods, quality considerations, and suggestions for householder education.

### **Bottle Resin Sales**

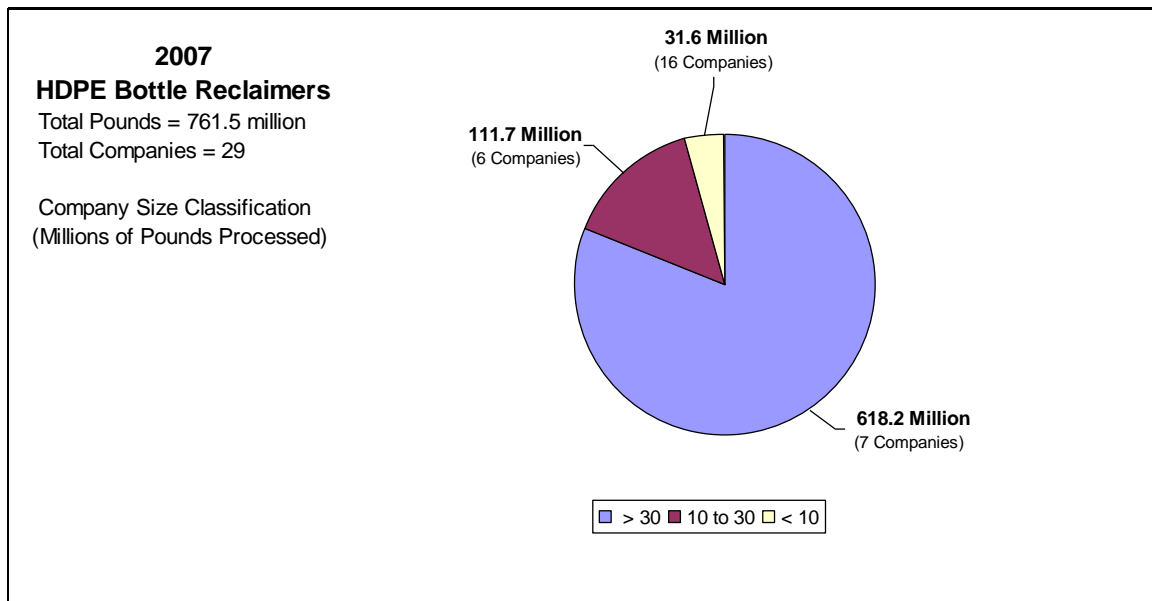
The denominator used to calculate the recycling rate is composed of both virgin resin and recycled resin used for bottle making.

Plastic bottle light-weighting continues. Some HDPE bottle applications are using product concentrates, which mean smaller bottles, or fewer bottles made for the total number of uses, such as laundry loads. Light-weighting meets economic and sustainability goals and is a relentless force in bottle making. While lighter bottles are more economically sustainable, recycling is denominated by weight.

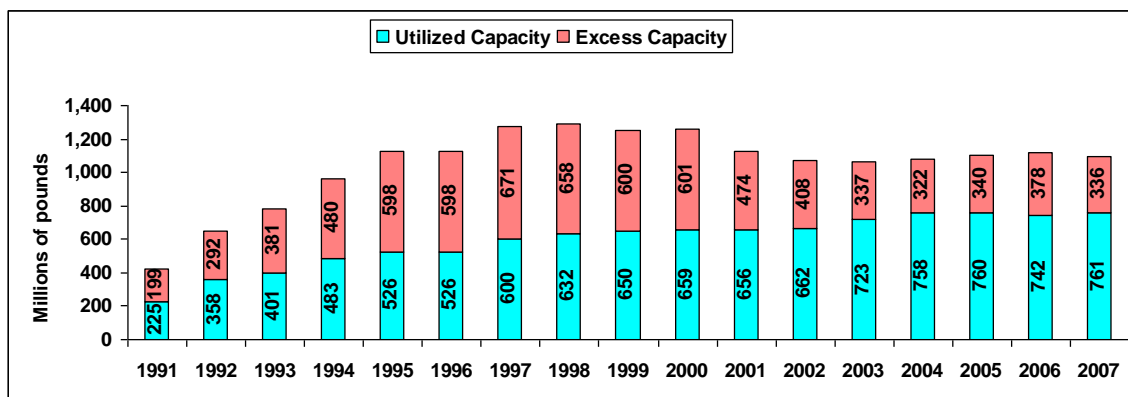
### Reclamation Industry Update

- The number of HDPE reclaimers stayed stable in 2007 as compared to 2006 with 29 companies. The number of smaller companies may vary year-to-year as industrial scrap companies change their business plans and start-ups and acquisitions continue.
- The largest companies, processing over 30 million pounds annually, processed 81% of the HDPE reclaimed.
- The amount of HDPE processed by US HDPE reclaimers rose by 19.8 million pounds to 761.5 million pounds.
- For HDPE bottle reclamation, capacity utilization, as defined, fell from 69% in 2005 to 66% in 2006 and rose back to 69% in 2007 as the calculated total washing capacity was adjusted downward slightly based on reports and the amount processed domestically rose.
- As in 2005 and 2006, the material supply in 2007 continued to be a major concern for both PET and HDPE reclaimers. The growth in domestic supply of baled bottles was insufficient to keep the US plastic reclaimers' plants full.
- The HDPE bottle recycling industry continues, as it has since 1996, to be supply limited.

**Figure 3**  
**Size Comparison of Domestic Reclaimers of HDPE Bottles**



**Figure 4**  
**HDPE Bottle Wash Capacity in the U.S.**



The figures shown above are estimates and should not be used for business planning purposes. Utilized capacity includes postconsumer material quantities processed domestically only. Capacity is based on 24 hours per day and 365 days per year.

## Export Markets

Buying of United States postconsumer bottles for export continued in 2007. Postconsumer plastic was exported out of the United States as bales of PET, PVC, polypropylene, and HDPE bottles; bales of commingled bottles and containers; mixed rigid container bales; and unwashed flake material.

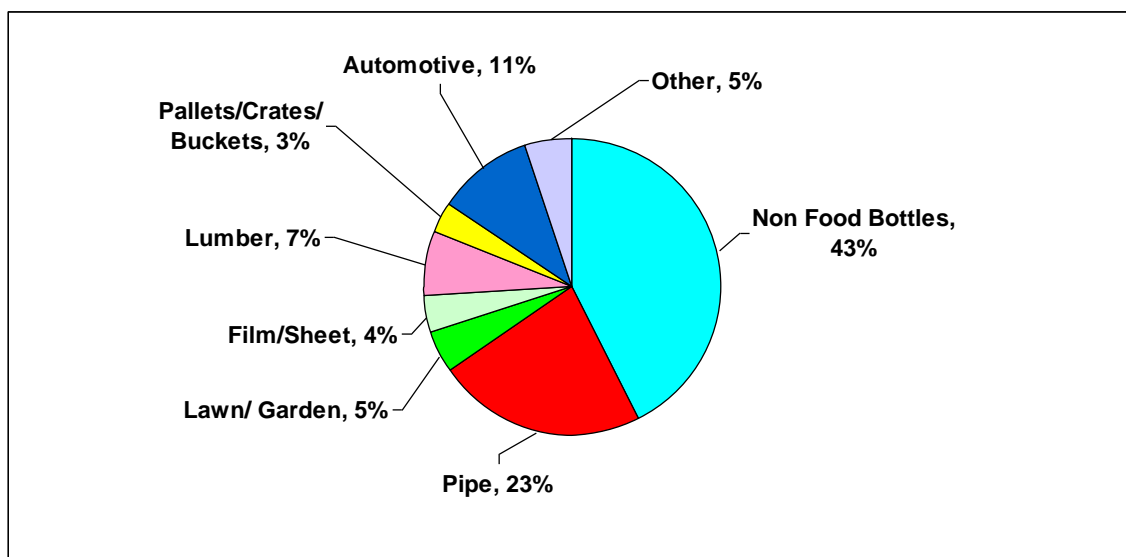
For US-collected HDPE bottle material, 214 million pounds were exported, representing 23% of the total bottle material collected domestically. 53% of those exports were to Canada. The trade in bales is not one-sided. US reclaimers imported 54 million pounds of postconsumer HDPE bales, about ¼ from Canada. The imported pounds are not included in the totals of pounds collected in the United States and are not part of the totals on Table 1 or Figures 1 or 2.

PET exports totaled 54% of the total bottles collected with most going to China. For polypropylene, approximately 69% of what was collected was exported, primarily as part of mixed resin and commingled bales.

## End Use Markets for Recycled Plastics

- Natural HDPE postconsumer recycled resin's primary markets continued to be for non-food application bottles, such as for detergent, motor oil, household cleaners, etc.
- Pigmented HDPE postconsumer recycled resin's markets continued to be pipe and lawn and garden products
- Plastic lumber continued to consume a broad range of materials including recycled HDPE, LDPE, mixed rigid containers, and wide-spec virgin resin.

**Figure 5**  
**Domestic Recycled HDPE Bottle End Use**  
**2007**



Compared to 2006, the market share for pipe applications rose from 17 to 23%, the market shares for lawn/garden, film/sheet, and lumber fell about 6 percentage points each while automotive uses rose from 2% to 11%. Automotive uses include ductwork for ventilation. The market share for non-food bottles stayed constant at 43%.

The yield of post consumer bottles to clean product ranged, depending on raw material and end use, from 84% to 90% with some raw material reported to result in yields as low as 75%. The increased presence of contamination in bales of HDPE bottles presented an ongoing challenge to reclaimers.

### **Additional Information**

ACC offers resources to communities who wish to increase postconsumer plastic collection. Details on the highly successful All Plastic Bottle collection programs can be found at [www.allplasticbottles.org](http://www.allplasticbottles.org). A database for the recycling of clean plastic film and grocery/retail bags is provided at [www.plasticbagrecycling.org](http://www.plasticbagrecycling.org). ACC maintains a database of buyers and sellers of recycled plastic and other valuable information, including school programs and a list of recycled plastic products, at the general website [www.americanchemistry.com/s\\_plastics/index.asp](http://www.americanchemistry.com/s_plastics/index.asp) or by accessing the pull down menu titled 'environment' near the top of the page.

APR offers resources at its website, [www.plasticsrecycling.org](http://www.plasticsrecycling.org) including lists of buyers and sellers of recycled plastic, market development workshop information, the Kids Zone for educating and involving children in plastics recycling, and technical resource documents to aid in designing recyclable packaging.



APR announces at its website upcoming webinars and workshops to help local recycling coordinators achieve better plastic recycling results.

NAPCOR provides additional information at its website, [www.NAPCOR.com](http://www.NAPCOR.com).

### **Legal Notice**

The 2007 United States National Post Consumer Plastics Bottle Recycling Report has been prepared to provide helpful ideas and information for parties interested in recycling plastics. Facilities developing a recycling process and all entities involved in the chain of collection, processing, distribution, and sale of recycled products have an independent obligation to ascertain that their plans, actions, and practices meet all relevant laws and represent sound business practices for their particular operations. Facilities may vary their approach with respect to particular operations, products, or locations based on specific factual circumstances, the practicality and effectiveness of particular actions and economic and technological feasibilities. This report is not designed or intended to define or create legal rights or obligations. ***ACC and APR do not make any warranty or representation, either express or implied, with respect to the accuracy or completeness of the information contained in this report;*** nor do ACC and APR assume any liability of any kind whatsoever resulting from the use of or reliance upon any information, conclusions, or options contained herein.

The Association of Postconsumer Plastic Recyclers and the Plastics Division of the American Chemistry Council produced this report.

The Post-Consumer Plastics Bottle Recycling Report was published by the Association of Postconsumer Plastic Recyclers and the Plastics Division of the American Chemistry Council for 2004 and 2005, and previously by the American Plastics Council, which merged with the American Chemistry Council in 2002. In 2006, the American Plastics Council was renamed the Plastics Division of the American Chemistry Council.

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