



**Association of Postconsumer  
Plastic Recyclers**



## **2008 UNITED STATES NATIONAL POST- CONSUMER PLASTICS BOTTLE RECYCLING REPORT**

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### **INTRODUCTION**

The 2008 edition of the United States National Post-Consumer Plastics Bottle Recycling Report is the 19<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 2008**

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

- The total pounds of plastic bottles recycled reached a record high 2,410 million pounds.
- The total plastic bottle recycling rate was 27.0%, up from 24.4% in 2007.
- The total pounds of plastic bottles collected increased by 75 million pounds for 2008 over 2007.
- The annual increase in pounds of plastic bottles recycled was 3.2%.
- The 19 year compounded annual growth rate for plastic bottle recycling is 9%.
- PET bottles collected increased by 55 million pounds.
- HDPE bottles collected rose by 16.1 million pounds to 936.7 million pounds, reflecting vigorous collection in the first three quarters of the year.

- The HDPE bottle recycling rate rose from 26.0% in 2007 to 29.0% in 2008, due in part to a reduction in demand for total bottle usage along with an increase in used bottles collected.
- Exports of US-collected HDPE bottle material were unchanged at 214 million pounds, 23% of domestically collected material with approximately 1/3 of the exports going to Canada.
- Imports of postconsumer HDPE to the United States increased by 160% to 141 million pounds, which allowed for better capacity utilization and meeting customer needs by reclaimers.
- Polypropylene bottle recycling totaled 21.2 million pounds, an increase of 21% over 2007.

### **Plastic Bottle Recycling Overview for 2008**

2008 was the year of ‘perfect storms’. Continuing innovation in packaging design for household products and beverage bottles resulted in lighter bottles and fewer pounds of recycling-available material for the same number of bottles. Market trends shifted on demand for some beverage packaging. The worldwide financial downturn starting in the fall of 2008 resulted in plummeting product prices for all recyclable postconsumer commodities (paper, plastics, steel, etc.). Plastics recyclers experienced severely reduced demand, excessive inventory, and liquidity issues, commonly experienced throughout U.S. manufacturing. Not uniquely, plastic bottle recycling was severely impacted with export demand plunging and disrupted commercial relationships, resulting in a steep decline in prices for bales of bottles for both PET and HDPE.

- Bottle production for the year was down, reducing the supply of recyclable bottles.
- Bale prices for recycled bottles remained high through the summer and into the fall of 2008, then plummeted in the fourth quarters of 2008
- Single stream collection of household recyclables continued to grow, generally resulting in higher overall household participation rates and more contaminated bales of bottles.
- California redemption programs collected not only PET, but also HDPE, PP, PVC, and LDPE bottles.
- HDPE recycling operations used significant imports of material to meet reclamation material demands. Plastic bottle recycling is not just a local or even domestic industry, but an international one with bales being imported and exported to meet commercial needs.

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



Polystyrene, PS



Other

PET and HDPE bottles continue to comprise over 96% (96.3%) of the U.S. plastic bottle market and over 99% (99.1%) 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 0.8% 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 to varying degrees 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. And, some #5 PP bottles were deliberately collected for export sales.

Finally, bottles coded bottles with “#7, Other” are not included in this report as a discrete category. Bottles coded #7 may include, among others, HDPE or PET or PP resins 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 2008 Compared to Calendar Year 2007 Results [1,2,3,4,5,6,7]**  
 (in millions of pounds per year)

Plastic Bottle Type	Calendar Year 2007			Calendar Year 2008		
	Plastic Recycled [2]	Resin Sales [3,4]	Recycling Rate	Plastic Recycled [2]	Resin Sales [3,4]	Recycling Rate
PET [4]	1396	5683	24.6%	1451	5366	27.0%
HDPE Natural	410.2	1654	24.8%	430.4	1523	28.3%
HDPE Pigmented	510.4	1886	27.1%	506.3	1713	29.6%
<b>Total HDPE Bottles</b>	<b>920.6</b>	<b>3540</b>	<b>26.0%</b>	<b>936.7</b>	<b>3236</b>	<b>29.0%</b>
PVC [5]	0.4	86	0.5%	0.4	72	0.5%
LDPE [5]	0.3	68	0.5%	0.4	70	0.5%
PP [6]	17.6	202	8.7%	21.2	186	11.4%
<b>TOTAL BOTTLES</b>	<b>2335</b>	<b>9579</b>	<b>24.4%</b>	<b>2410</b>	<b>8930</b>	<b>27.0%</b>

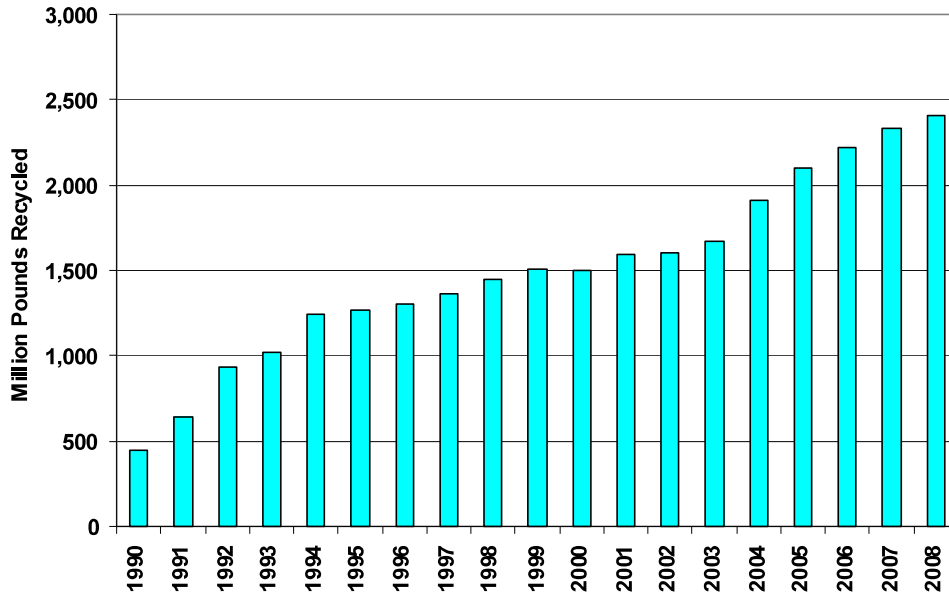
- [1] These data provide a snapshot of plastic bottle recycling collection trends from the national perspective. The data are particularly useful in identifying national trends and highlighting changes that have occurred from year to year, and may be a useful tool for planning purposes. While national 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: 2008 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 2/3 of polypropylene bottles were deliberately recycled as polypropylene bottles, about 1/8 were included in commingled and mixed plastic bales, and about 1/4 were included with colored HDPE.
- [7] National data for bottles of other resins are not available.

Many natural homopolymer HDPE milk bottles are now pigmented, the usual visual indicator of the use of copolymer, and those bottles become included in the usually pigmented copolymer bottles. The recycled HDPE 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. In comparison with 2007, the 2008 HDPE denominator (bottles in the market place) decreased by 305 million pounds, or 8.6%, and the HDPE numerator (bottles recycled) increased by 16.1 million pounds, or 1.8%

About 5% of the total #2 through #5 bottles collected was 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 4% 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.

Domestic processing of postconsumer polypropylene bottles totaled 9.1 million pounds, a 64% increase over 2007. More polypropylene from injection molded closures was recycled, but that amount is not part of this report on bottles.

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

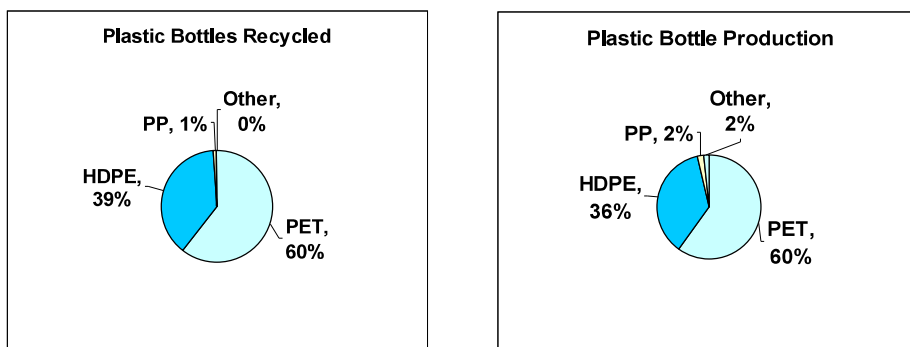


**SOURCE: NAPCOR, all years, for PET. For other bottle resins,  
R.W. Beck, Inc., 1990-2006; Moore Recycling Associates, Inc., 2007-2008**

The growth in total pounds of postconsumer bottles collected for recycling continued in 2008. A total of 2,410 million pounds of plastic bottles are reported as collected for recycling. The change from 2007 was an increase of 75 million pounds of recycled bottles, or an increase of 3.2%. This happened in the face of decreased overall use of plastics to make bottles and the global financial meltdown in the fall of 2008.

The change in total resin used to make bottles was a decrease of 650 million pounds, or a decrease in bottle production of 6.8%. Use of HDPE to make bottles decreased by 305 million pounds, or 8.6%. Use of PET to make bottles decreased by 317 million pounds, or 5.6%.

**Figure 2**  
**2008 Plastic Bottles Recycled and Plastic Bottle Production by Resin**



Source: Moore Recycling Associates, Inc. 2008  
NAPCOR, 2008

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 through 2007, 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 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.

Again in 2008 the Association of Postconsumer Plastic Recyclers, with support provided from the plastics industry through 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.

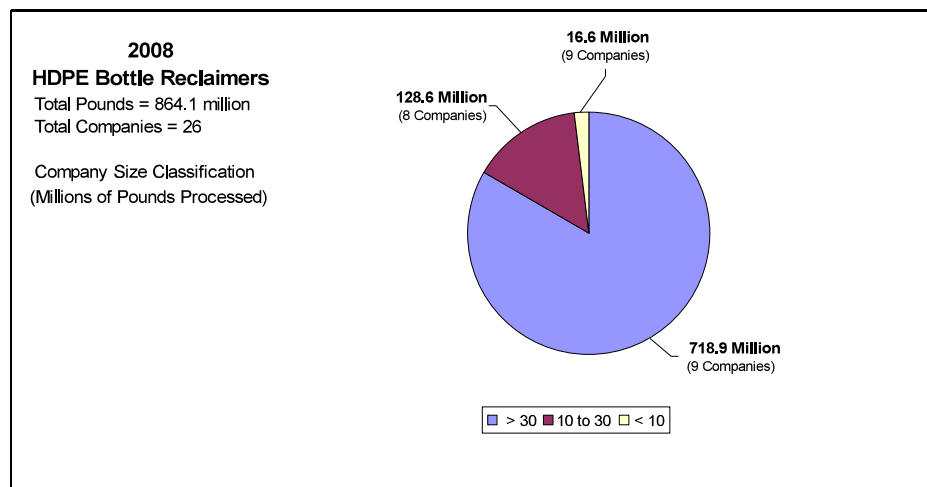
Plastic bottle light-weighting continues. Many HDPE bottle applications are using product concentrates, which means an increasing number of smaller bottles, or fewer bottles made for the total number of uses, such as laundry loads. Light-weighting meets

economic and sustainability goals and is a relentless force in bottle making. While lighter bottles are more economically sustainable, recycling is denominated by weight. The denominator for HDPE used to make bottles fell by 8.6% even with a 34 million pound increase in the amount of postconsumer HDPE for bottle making.

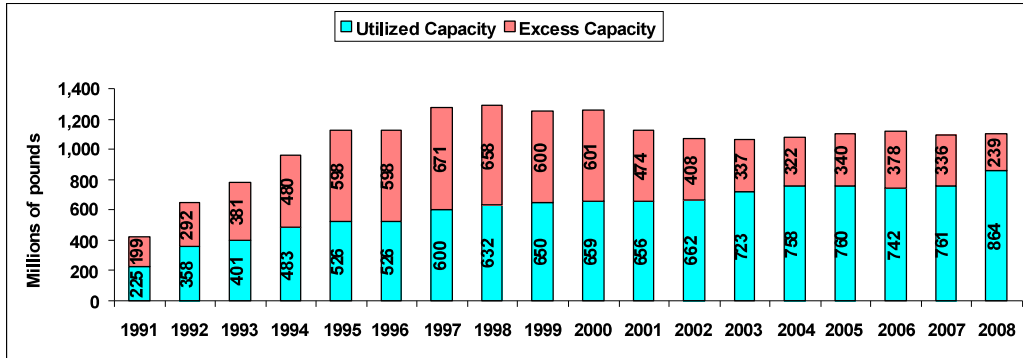
### HDPE Reclamation Industry Update

- The number of HDPE reclaimers fell in 2008 as compared to 2007 with 26 companies active at year's end. One company switched from processing both PET and HDPE to just PET. 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 83% of the HDPE reclaimed and increased in number, reflecting some expansions in capacity.
- The amount of HDPE processed by US HDPE reclaimers rose by 102.6 million pounds to 864.1 million pounds. The majority of the increased pounds processed came from imported feedstock.
- For HDPE bottle reclamation, capacity utilization, as defined, was 69% in 2005 and 66% in 2006 and 69% in 2007. In 2008 capacity utilization rose to 78% as the overall capacity stayed fairly constant and more pounds were processed.
- 2008 was on track to be an excellent year for plastics reclaimers, other than the perpetual shortage of domestic bales. Imports were filling out capacity and meeting customer needs. Then beginning in the autumn business virtually stopped. Buying and selling went into freefall with prices of bales dropping 70 to 78% in 8 weeks or less. Cash flow became critical and inventory adjustments a necessity. As the year ended, the markets for supply and demand started to move again, but slowly.

**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 and Import Markets

Buying of United States postconsumer bottles for export continued in 2008. 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, the same value as reported for 2007. Unlike in 2007 with 53% of those exports going to Canada, in 2008 35% went to Canada. The trade in bales is not one-sided. US reclaimers imported 141 million pounds of postconsumer HDPE bales, about three times the amount imported in 2007. 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.

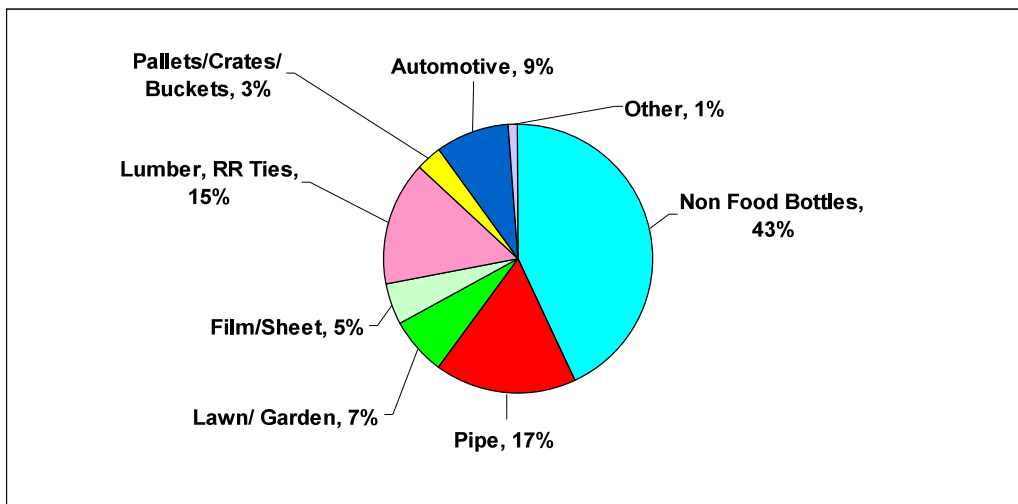
PET exports totaled 57.6% of the total bottles collected with most going to China. For polypropylene, approximately 57% of what was collected was exported, primarily as part of mixed resin and commingled bales.

### 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 and for films.
- Pigmented HDPE postconsumer recycled resin's markets continued to be pipe and lawn and garden products and non-food application bottles.
- 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**  
**2008**



Compared to 2007, the market share for pipe applications dropped back to the same value as in 2006, 17%. The market shares for lawn/garden and for film/sheet rose slightly. The market share for lumber and railroad ties doubled to 15% of HDPE PCR use. The market share for automotive uses drifted down slightly to 9%. 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 75% to 90%. The average yield of bales to clean pellets in 2008 was 80.4%, comparing to 84.3% in 2007. The increased presence of contamination in bales of HDPE bottles presented an ongoing challenge to reclaimers.

### **Additional Information**

ACC offers resources to communities that 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 2008 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.

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