

2017 National Post-Consumer Non-Bottle Rigid Plastic Recycling Report

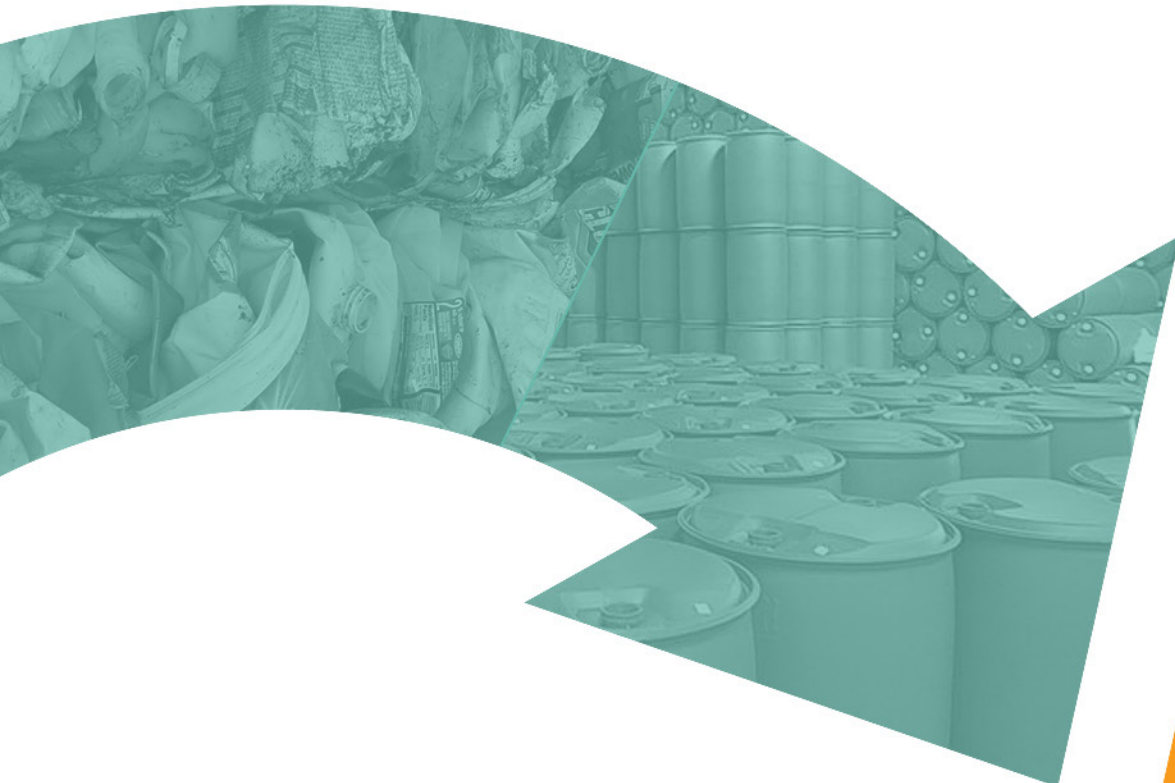


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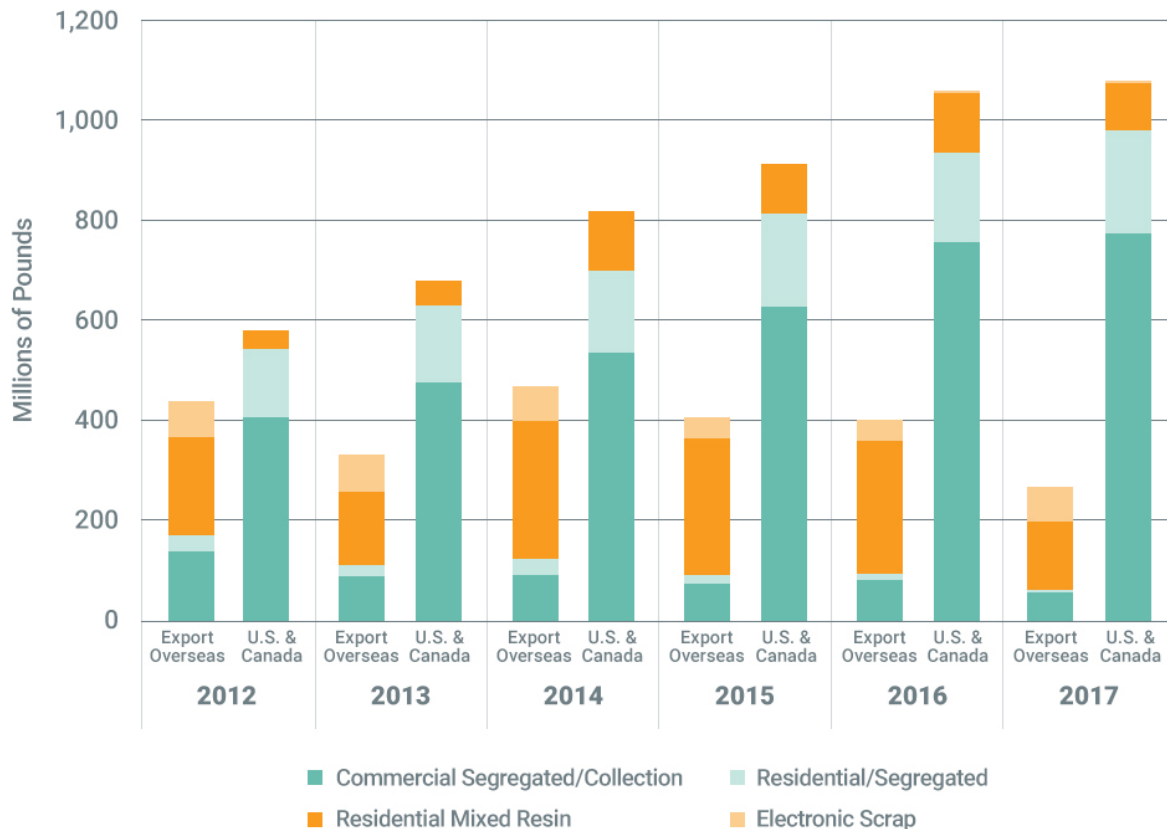
The 2017 National Post-Consumer Non-Bottle Rigid Plastic Recycling Report is the eleventh annual report on pounds of post-consumer¹ non-bottle rigid plastics—packaging and non-packaging—recovered² for recycling in the United States (U.S.). Research for this report was conducted by More Recycling (MORE) for the Plastics Division of the American Chemistry Council.

¹ The U.S. Environmental Protection Agency (EPA) defines “post-consumer material” as a material or a finished product that has served its intended use that is then diverted or recovered before it is disposed as solid waste. It is the material consumers and businesses collect for recycling; it does not include manufacturers’ waste, which is commonly reused in the original manufacturing process. The EPA defines “pre-consumer” as material that is recycled before it is used by a consumer (EPA WebArchive - https://archive.epa.gov/epawaste/conservation/smm/wastewise/web/html/buyq_a.html). This study uses EPA’s definition throughout this report, wherein “post-consumer” refers to plastics that have been previously used for their intended purpose by consumers and businesses. Commercial materials that have met their intended use are often recovered outside of curbside or drop-off collection programs and include items such as totes, pallets, crates, and other commercial packaging. This report does not cover the recycling of post-industrial (pre-consumer) materials. An example of post-industrial material is scrap and trimmings that are generated in manufacturing and converting processes.

² “Recovery” or “recovered” throughout this report refers to material collected for recycling and sold to domestic or export buyers.

A minimum of 1.35 billion pounds of post-consumer non-bottle rigid plastic was reported as recovered for recycling in 2017. After a nine-year period of significant growth, during which recycling of this material quadrupled, the total amount recovered dropped by 108 million pounds, which is a seven percent decrease compared to 2016. As in previous years, the majority of non-bottle rigid plastic was purchased by U.S. and Canadian reclaimers. Despite the overall decrease in plastic recovered for recycling, domestic reclaimers continued to purchase more non-bottle rigid plastic as in previous years. Domestic purchases grew two percent in 2017 compared to 2016.³ While domestic reclamation increased, export buyers purchased 33 percent less non-bottle rigid plastic, reducing the total purchases by export buyers to 20 percent of the total non-bottle reported as recycled in 2017 compared to 27 percent in 2016.

Figure 1: U.S. Non-Bottle Rigid Plastic Recovered



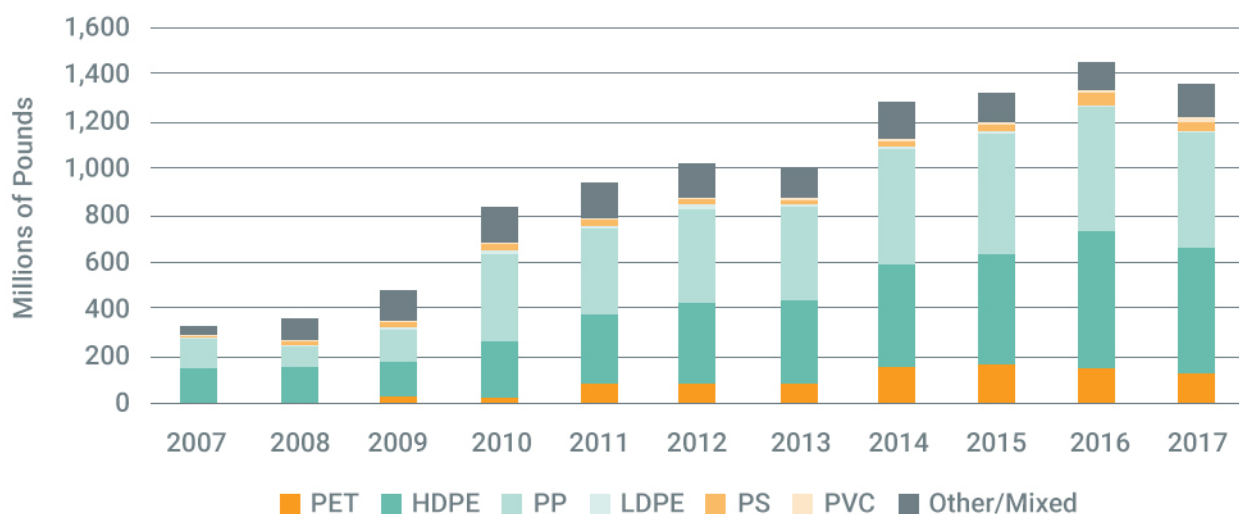
In addition to the continued trend of more material flowing to domestic reclaimers than export, more material was segregated by resin. In 2017, 77 percent of non-bottle rigid plastic recovered for recycling was segregated by resin, compared to 71 percent in 2016. The remaining 23 percent recovered in 2017 was mixed resin material; 17.4 percent was mixed resin rigid bales and 5.4 percent was electronic scrap plastic. Export purchases were down for residential material

³ United States' and Canadian purchases of non-bottle rigid plastics are combined throughout this report and may be referred to collectively as "domestic" purchases so as to distinguish them from material that is exported overseas.

(mixed resin and segregated by resin categories) and commercial material. The U.S. and Canadian reclaimers purchased more commercial non-bottle plastic and residential non-bottle plastic segregated by resin but reported a decrease in purchases of mixed resin rigid bales. The domestic market purchased 69 percent of the residential non-bottle plastic, changing the historical trend of the export market dominating purchases in this category.⁴ The largest decreases in purchases of mixed resin rigid bales were primarily 3-7 Bottle and All Other Rigid Plastic (containing bulky) and the 3-7 Bottle and Small Rigid Plastic categories. The only mixed rigid category with a significant gain in 2017 was the Mixed Bulky Rigid Plastic category, which also had an increase from 2015 to 2016. (See Methodology: Survey Categories for all non-bottle rigid plastic category definitions.)

Non-bottle rigid plastic from the residential and commercial sector is primarily comprised of high-density polyethylene (HDPE) and polypropylene (PP); together HDPE and PP made up 76 percent of the non-bottle rigid plastic acquired for recycling in 2017.

Figure 2: U.S. Non-Bottle Rigid Plastic Recovered Year to Year by Resin



PET - polyethylene terephthalate, HDPE - high-density polyethylene, PP - polypropylene, LDPE - low-density polyethylene, PS - polystyrene, PVC - polyvinyl chloride

⁴ More Recycling surveys and counts material from reclaimers, which are defined as companies that wash post-consumer material or otherwise process unwashed material into a clean feedstock or end product.

Data on recovered post-consumer non-bottle rigid plastic are collected through a voluntary, annual plastic recycling survey that also gathers data on bottles, film and other plastics. For this report, the survey gathers data on residential and commercially generated recycled plastic. Residentially generated commodities are both mixed resin rigid plastic and non-bottle rigid material further segregated by resin. Commercial material includes products that have met their intended use, such as packaging for transport—pallets, crates, and totes—and material collected through special programs by the commercial sector, such as battery casings.

THE FOLLOWING STEPS ARE TAKEN TO PREPARE THE REPORT

- MORE continually updates its markets database to include current exporters, reclaimers, and other handlers of plastic scrap;
- MORE conducts an electronic survey of market participants in plastic recycling to collect data; and
- MORE undertakes a follow-up step for survey-collected data, to help check the accuracy of the data through follow-up calls, conversations with industry contacts, and reviews of other public sources of recycling industry information.

DATA COLLECTION AND ANALYSIS

MORE continually updates a proprietary database of plastic exporters, processors, reclaimers, and key brokers to help ensure that the survey reaches the key plastic scrap buyers of material sourced for recycling in North America.⁵

MORE uses a custom-designed, web-based survey system to gather data. Although the overall methodology has not changed since the first report, MORE continually seeks ways to improve the completeness and timeliness of the survey responses. These changes allow for better material flow tracking and assist with prevention of double counting.

The survey is distributed by sending an email with a unique link to each survey contact, including both U.S. and Canadian reclaimers, export buyers for all post-consumer plastic, as well as some key players within the value chain, such as MRFs, brokers, and end users. After an appropriate amount of response time has passed, MORE employees send follow-up emails and make telephone calls to retrieve data. The data are entered into the online survey tool, either directly by the company surveyed, or by MORE staff in conjunction with the relevant company. Incoming data are reviewed for accuracy, and follow-up calls are made as needed.

⁵ Through its project work in the industry and on the websites it manages—PlasticsMarkets.org, RecycleMorePlastic.org, and PlasticFilmRecycling.org—MORE regularly engages with companies and new contacts in this sector. MORE also identifies potential buyers through published market databases and conversations with suppliers, such as material recovery facilities (MRFs) and key reclaimers.

After data collection is complete, the data are compiled and categorized based on the detail reported.⁶

The residential commodity categories may be a mixture of resins, or some combination of bottles, containers, bulky items, and other non-bottle rigid plastic. Some are further segregated by resin and others are intentionally a combination of both resin and product type.

Where the commodities are a mix of bottle and non-bottle or resin, the non-bottle rigid plastic portion of the mixed rigid bales reported by respondents is calculated for this report by applying the content percentages of resin and product type from the 2014/15 mixed rigid bale composition study with some adjustment given industry provided data since that study.⁷ The 2016 report also used the 2014/2015 study data whereas previous reports dating back to 2011 used the 2011 composition study.⁸

The final data totals are reviewed, analyzed, and reported in as much detail as possible without compromising the participating companies' confidentiality. In order to determine trends and identify anomalies that may require further vetting, the analysis includes year-to-year comparisons of the totals, material categories, and trends among export and U.S. and Canadian buyers. This quality control, which often requires follow-up with survey responders, is essential to determining if there has been an actual shift or just an entry error by the responder. Clarification may also be needed to determine whether reported material can be counted as post-consumer/commercial or if it is, in fact, post-industrial scrap. Describing how the data are collected, as well as what is and is not included in the survey, provides readers of this report with the context necessary to cross-reference the results with other available industry data.

SURVEY CATEGORIES

MORE is involved in the plastic recycling industry's work to harmonize commodity categories and the terminology used by the industry. Updates to categories are reflected in MORE's survey, this report, and in the other tools and resources that MORE manages. This is critical in order to report on the key materials, to avoid misunderstanding, and to further support harmonization of terminology used in the industry.⁹ The model bale specifications, maintained by the Association of Plastic Recyclers (APR), are a key resource in this process.¹⁰

6 MORE conducts the survey and takes steps to maintain the confidentiality of individual responses; including procedures designed so that no individual company data are released, nor are any specific data that do not include at least three companies reporting.

7 National Mixed Rigid Plastic Bale Composition Study, Association of Plastic Recyclers (APR), July 2015.

8 National Mixed Rigid Plastic Bale Composition Study & Analysis of Non-Bottle Rigid Plastic Available for Recycling, Association of Plastic Recyclers (APR), 2011.

9 The Plastic Recycling Terms and Tools resource is intended to help harmonize terminology across the plastic recycling value chain. This resource can be found at <https://www.recycleyourplastics.org/recycling-professionals/education/terms-tools-app/>.

10 Bale specifications maintained by the Association of Plastic Recyclers (APR) are in alignment with the Plastic Recycling Terms and Tools, <https://www.plasticsrecycling.org/resources/model-bale-specs>.

The 2017 survey included the following rigid plastic categories:

Mixed Resin Rigid Plastic from Residential Collection

- **3-7 Bottles and Small Rigid Plastics** - Bottles are mostly PP (PET and HDPE bottles have mostly been removed) also includes 1-7 containers (tubs, lids, cups, trays, clamshells) and products (non-packaging items like hangers)
- **3-7 Bottles and All Other Rigid Plastics** - Bottles are mostly PP (PET and HDPE bottles have been removed) also includes 1-7 containers, products (see above) and large items (buckets, totes, crates, lawn furniture, carts, storage bins and other large items)
- **1-7 Bottles and Small Rigid Plastics** - All bottles, containers (tubs, lids, cups, trays, clamshells) and products (non-packaging items like hangers)
- **1-7 All Rigid Plastics** - All bottles, containers, products (see above) and large items (buckets, totes, crates, lawn furniture, carts, storage bins and other large items)
- **Mixed Bulky Rigid Plastics** - A mix of large items that are a mix of resins, but mostly PE and PP (buckets, totes, crates, lawn furniture, carts, storage bins and other large items)
- **Mixed Clamshell** - A mixture of PET, PP, PS, and PVC thermoformed containers (trays, cups, clamshells, boxes)
- **Other Mixed Bottle and Non-bottle Rigid Plastic** - A “catch-all” category, defined on a case-by-case basis.

Plastic Further Segregated by Resin from Residential Collection

- **PET Thermoforms** - PET packaging not including bottles or jars (includes but not limited to egg cartons, baskets, clamshell containers, cups, lids, cake domes, covers, tubs, deli containers, trays and folded PET sheet containers)
- **HDPE Colored Bottles with Containers** - Pigmented bottles and containers; containers are typically canisters or jars
- **PP Small Rigid Plastics** - PP bottles, containers and products (includes but not limited to prescription bottles, yogurt cups, margarine tubs, ice cream tubs, cold drink cups, tofu tubs, dishwasher safe storage containers, hangers)
- **PP All Rigid Plastics** - PP bottles, containers, products (see above) and large items (buckets, totes, crates, lawn furniture, carts, storage bins and other large items)
- **Tubs and Lids** - Primarily PP and PE Non-bottle rigid household containers (yogurt cups, margarine tubs, ice cream tubs, cold drink cups)
- **Tubs and Lids with Bulky** - Primarily PP and PE Non-bottle rigid household containers (see above) and large items (buckets, totes, crates, lawn furniture, carts, storage bins)
- **HDPE Injection Bulky Rigid Plastics** - HDPE large plastics (includes buckets, totes, crates, lawn furniture, carts, storage bins), may include some bulky PP and LDPE

Other Categories

- **Mixed Electronic Scrap** - Primarily high impact polystyrene (HIPS), acrylonitrile butadiene styrene (ABS), polycarbonate (PC)
- **Categories for Commercial Generated/Collected Non-Bottle Rigid Plastic Segregated by Resin** - A list of major categories of non-bottle rigid plastic from commercial sources generating these commodities through their course of business or through special collection programs (e.g., PP battery casings). The list is based on categories that respondents have offered in previous surveys (e.g., HDPE injection [drums-buckets-crates], PP hangers, PVC Flooring, and PC CDs). MORE also provides an “other” category for PET, HDPE, PP, PS, PVC, ABS, and PC
- **Other Non-Bottle Rigid Plastic** - A “catch-all” category for non-bottle rigid plastic segregated by resin that is different from the specific resin categories listed above
- **Other Post-Commercial Mixed Rigid Plastic** - A “catch-all” category for mixed resin rigid plastic that is generated from businesses, defined on a case-by-case basis

The APR and the National Association for PET Container Resources (NAPCOR) conduct a separate, but similar, survey of U.S. and Canadian PET reclaimers. MORE does not survey these PET reclaimers and receives the aggregate data for non-bottle rigid plastic (e.g., thermoforms, cap and label material obtained through the PET bottle reclamation process and some post-commercial data) from APR/NAPCOR. Reclay StewardEdge (RSE) also assisted MORE in obtaining non-bottle rigid plastic recycling data for 2016 and 2017, with a focus on closed loop recyclers.

Participation in the survey is voluntary and the reported data are based on responses received. Many companies have limited resources to put towards participation in the survey, and some companies may choose not to respond due to confidentiality policies. Therefore, as there is not 100 percent participation, the presented totals represent the minimum amount of non-bottle rigid plastic recovered for recycling and sold into the marketplace. Only data provided by North American reclaimers and exporters selling directly overseas, are included in the reported totals, unless we determine that data are missing in areas where substantive information from other reliable resources is available. Only U.S. and Canadian reclaimers currently respond to the survey. If reclaimers omit their capacity data, MORE uses the pounds purchased for recycling as an estimate of their respective capacities. Data provided by brokers and MRFs are primarily used as a reference to better understand the flow of material, but MORE may include their data if enough information is provided that would enable attribution of material sold to a non-responding reclaimer or exporter.

Again, since participation in the survey is voluntary, MORE sometimes receives responses from existing companies that did not previously respond. Changes in year-to-year recovery rates are often a combination of changes in collection along with material that was recycled in previous years but not reported. When MORE can conclude the nature of an increase (or decrease), the reasoning is indicated. However, it can be difficult to make a reliable determination in any given year, depending on the depth of information MORE receives from plastic handling companies for previous years and while taking into account the need to protect confidentiality.

MORE tracks exporters' purchasing of plastic through a number of industry resources. Except for the largest exporters, companies in the export market come and go, and may change the type or mix of materials that they purchase. Increased volatility in the export market began in 2017 with the National Sword policy in China restricting the import of scrap materials, which took effect in 2018 when the data for 2017 was gathered. This situation made it a particularly challenging year to track exporters.

In addition to the potential impact of non-responders, changes in how responders report pounds in the survey categories can impact the totals reported year over year. Mixed resin rigid bale commodities often require follow-up and a data quality check due to the inconsistent terminology used in the marketplace to describe these commodities.

Post-commercial material, which is material from the commercial sector that has met its intended use, can be difficult to track because it is often purchased by companies that are also handling industrial scrap. The survey now specifically includes a detailed section on post-industrial plastic recycling to encourage responses from industrial/commercial scrap recyclers. Having an additional focus on post-industrial recycling enables us to engage these recyclers about post-commercial material that they handle, and that they may not realize is considered post-consumer.

As previously mentioned, MORE applied the bale composition results from the 2014/15 study commissioned by the APR, adjusted based on additional industry data, to the mixed resin rigid plastic bale quantities reported by responders to arrive at the non-bottle portion of these bales, separated by resin.¹¹ Only the plastic portions of the mixed resin rigid bales are included in the quantity totals; the waste is removed, unlike gross quantities that are used for most other recycled commodities.

Based on separately available industry statistics for lead-acid battery and e-scrap recycling, it is likely that MORE did not receive survey responses from some key players in these sectors, and the total reported is likely less than the actual amount of plastic recycled from these two key recycling efforts.

¹¹ National Mixed Rigid Plastic Bale Composition Study, Association of Plastic Recyclers (APR), July 2015.

NON-BOTTLE RIGID PLASTIC RECYCLED

In 2017, the amount of non-bottle rigid plastic reported as recovered in the U.S. for recycling was 1.35 billion pounds, quadruple the 2007 total and an increase of over 1 billion pounds since that first reporting period. The 2017 reported amount was the first decrease since reporting began and a seven percent decline from 2016.¹² Approximately 80 percent of the 1.35 billion pounds was reclaimed in the U.S. or Canada in 2017, with the remainder exported overseas. As previously noted, because participation in the survey is voluntary, the data in the report understates the total non-bottle rigid plastic acquired for recycling.¹³

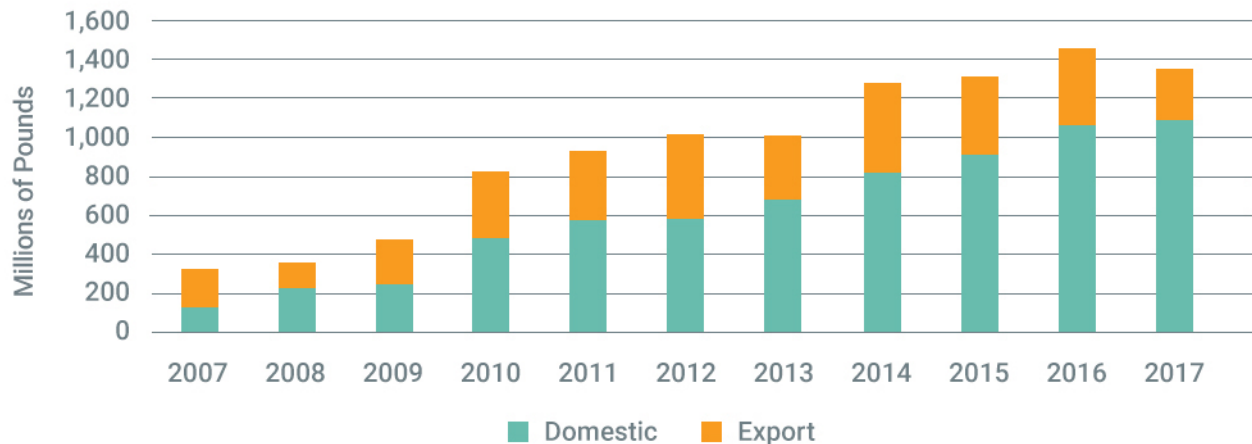
Table 1: U.S. Post-Consumer Non-Bottle Rigid Plastic Recovered

Year	Exported (Millions of Pounds)	Purchase for Use in U.S. or Canada		Total (Millions of Pounds)
		Volume (Millions of Pounds)	Percent	
2007	204.0	121.4	37%	325.4
2008	137.1	223.6	62%	360.8
2009	236.1	243.1	51%	479.2
2010	350.9	475.8	58%	826.7
2011	361.5	572.4	61%	933.9
2012	437.2	579.5	57%	1,016.7
2013	329.0	678.7	67%	1,007.7
2014	467.8	816.5	64%	1,284.3
2015	407.1	912.1	69%	1,319.2
2016	398.1	1,057.0	73%	1,455.1
2017	266.6	1,080.5	80%	1,347.1

¹² Responses for post-commercial rigid plastic were more robust beginning in 2010. Some portion of the post-commercial data documented first in 2010 likely was also recycled in previous years.

¹³ Due to an additional effort to collect data from closed loop commercial reclaimers, the 2015 data has been updated since the 2015 report was released, and that update is reflected in this report. The 2015 report documented 1.24 billion pounds and this report is updated to 1.32 billion pounds, a 3% increase over 2014.

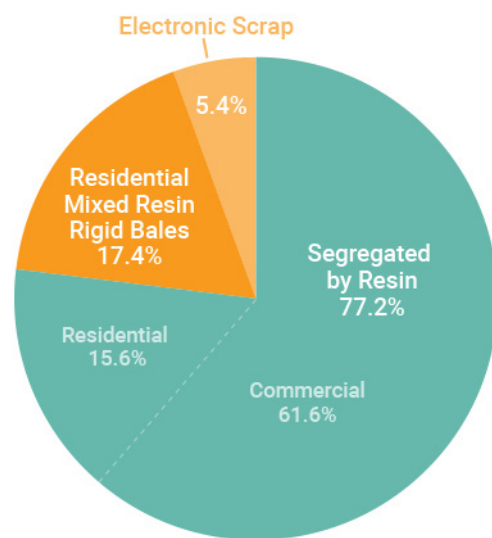
Figure 3: Purchases of U.S. Post-Consumer Recovered Non-Bottle Rigid Plastic



From 2016 to 2017, the recovery of non-bottle rigid plastic decreased by 108 million pounds. Export purchasing dropped by 131.6 million pounds, but domestic purchasing increased by 23.5 million pounds. U.S. and Canadian buyers reported a decrease in purchasing of mixed resin rigid bales, with most of their overall increase coming from the purchasing of non-bottle rigid plastic segregated by resin from both residential and commercial sources.¹⁴ Exporters reported decreases from 2016 to 2017 for segregated non-bottle plastic both commercial and residential sourced, as well as more significant decreases in mixed resin rigid bales.

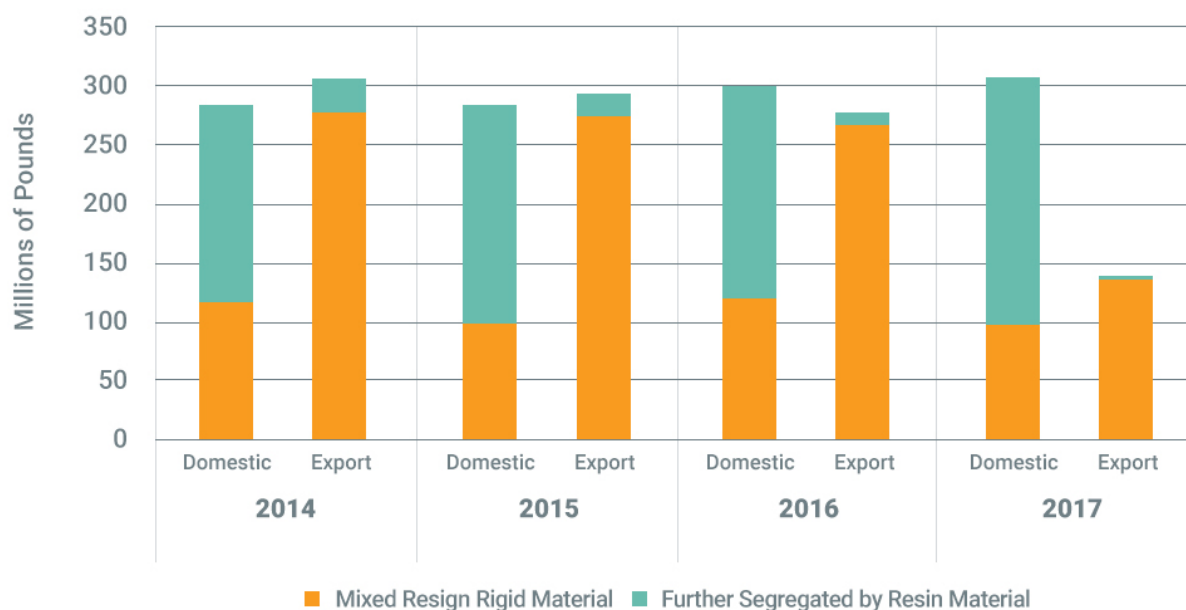
Seventy-seven percent of the non-bottle rigid plastic is segregated by resin with the remaining 23 percent purchased as mixed resin material. Sixty-two percent of the non-bottle rigid plastic recycled is from commercial sources, 33 percent is from residential collection, and 5 percent is from electronic recycling, which is likely a combination of residential and commercial. Eighty percent of the segregated material is from commercial sources with residential sources making up the remaining 20 percent. Segregated material increased by 7 percentage points from 2016. The non-bottle rigid plastic portion of mixed resin rigid bales comprised 17 percent of the total quantity reported, down 10 percentage points compared to 2016.

Figure 4: Sources of U.S. Recycled Non-Bottle Rigid Plastic, 2017



¹⁴ Non-Bottle Rigid Plastic Segregated by Resin includes commercial sourced/collected plastic and residential sourced plastic. Residential sourced material is further segregated but may not be entirely one resin.

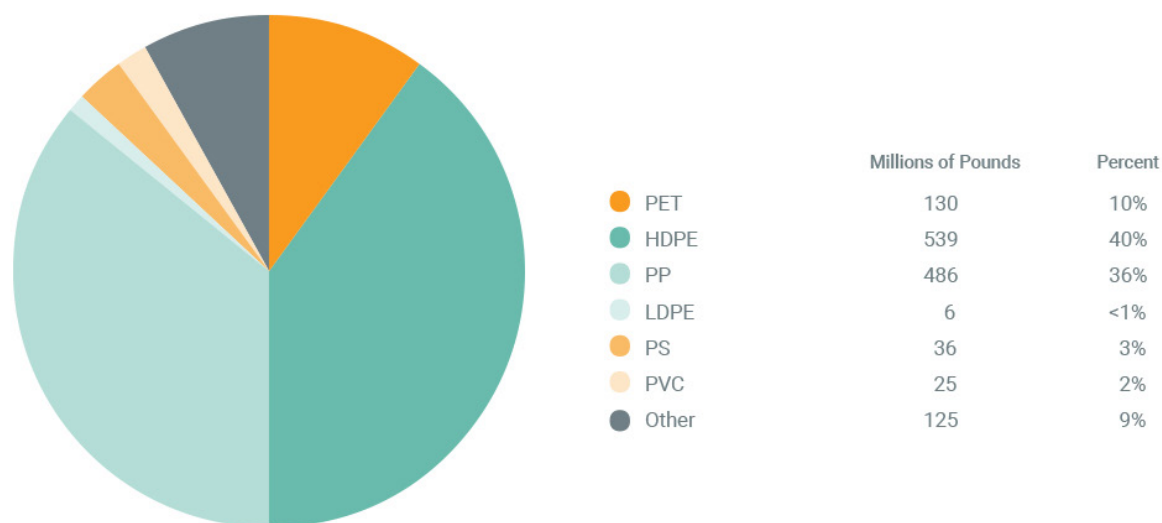
Figure 5: Non-Bottle Plastic from Residential Sourced Material



U.S. and Canadian markets continue to dominate the purchase of residential sourced non-bottle plastic further segregated by resin, reporting nearly 100 percent of purchases in this category in 2017. Export purchases decreased by nearly 9 million pounds to a negligible amount in 2017.

Export purchasing of non-bottle rigid plastics from mixed resin rigid bales dropped by 131 million pounds, a 49 percent decrease compared to 2016, with an additional decrease of 22 million pounds or 18 percent by domestic markets. Down from 73 percent in 2016, 53 percent of the residential non-bottle rigid plastic was purchased as part of mixed resin rigid bales, representing combined U.S., Canada and export market purchases. The decline in export purchases of residential material overall brought the export percentage of non-bottle residential material to 31 percent, compared to 48 percent in 2016.

Figure 6: U.S. Post-consumer Non-Bottle Rigid Plastic Recovered in 2017 By Resin



In 2017, 76 percent of the non-bottle rigid plastic recycled was HDPE and PP (40 percent HDPE and 36 percent PP). PP and HDPE together comprise a significant majority of the non-bottle rigid plastic in mixed resin rigid bales, and the majority of reported segregated resin material. HDPE and PP shared equally in the largest portion of the overall decrease in non-bottle rigid recycled in 2017 at approximately 46 and 45 million pounds respectively, primarily due to the decrease in purchasing of mixed resin rigid bales. PET made up the third largest portion and also decreased by 23 million pounds. LDPE and PS had modest decreases, while PVC, due to new responders, and the Other/Unknown/Mixed category had modest increases.

UNITED STATES & CANADIAN CAPACITY AND END MARKETS

MORE estimates the non-bottle rigid plastic reclamation capacity in the U.S. for 2017 was approximately 1.3 billion pounds, a measure of total annual “pounds in” capacity to wash or process unwashed material directly into regrind, pellets, or end products. At least 100 million pounds of additional non-bottle reclamation capacity was estimated in Canada for 2017, drawing on both U.S. and Canadian material. It is important to acknowledge that there was likely additional grind capacity, in both the U.S. and Canada, for plastic scrap that was clean enough to be used unwashed that is not included in the reclamation capacity reported above. This material is often sold as regrind to manufacturers that use it as they would a washed flake or pellet.

Most of the U.S. reclamation capacity for non-bottle rigid plastic is for relatively clean segregated PE and PP items, because it can be handled more cost effectively and often does not require washing. These items include, but are not limited to: buckets, drums, crates, battery casings, storage bins, and hangers.

End uses for non-bottle rigid plastics are automotive products, crates, buckets, pallets, lawn and garden products, and other relatively thick-walled injection molded products. A small portion of the non-bottle rigid plastic recovered is used in plastic lumber, rail ties and other extruded products.

THE REMAINING SECTIONS OF THIS REPORT PRESENT DISCUSSION AND RECOMMENDATIONS THAT REFLECT MORE RECYCLING'S EXPERTISE AND INDUSTRY KNOWLEDGE.

CHARTING NEW TERRITORIES

MORE tracks the non-bottle rigid plastic recycling market throughout the calendar year. 2017 was another volatile year for rigid plastics. Most non-bottle scrap plastic commodities endured a downward value trend in 2017.

With a significant drop in purchasing of mixed rigid plastic by export buyers, 2017 was the start of a transition away from a reliance on export buyers that lasted more than a decade, particularly for lower quality and mixed resin bales. On top of the loss in demand from China, recyclers struggled with lack of demand from end users.

Reactions to the contracting demand from the export market have been varied across the United States. While some MRFs are moving towards increased segregation of plastics to meet domestic market requirements, other MRFs are focusing on the collection of PET and HDPE bottles only. Of the total inbound material, including paper, metals, and glass, plastics only make up roughly 5 percent of the material handled by MRFs. Since MRFs also struggled to find markets for paper and cardboard (the majority of their stream), plastics dropped in priority. The non-bulky plastics collected through MRFs beyond PET and HDPE bottles are referred to as 3-7 bottles and small rigid plastic.¹⁵ They made up approximately 15 percent of all plastics getting recycled through MRFs, when 3-7 bottles and small rigid plastic collection was at its peak. An example of a material caught in the middle of the infrastructure bottle neck is PP. Roughly one third of the 3-7 bottle and small rigid plastic is PP, and demand was relatively high for PP in 2017; however, not all MRFs were equipped or had the means to sort out the PP.

The fundamental challenges outlined in the **2016 Report** persist. Most of the domestic reclamation capacity that does exist is setup to take segregated plastic material and the U.S. is not well-positioned to sort beyond PET and HDPE bottles. Domestic sorting capacity and more processing capacity for non-bottle rigid plastic is essential to be able to handle the residential non-bottle rigid plastic that is available for recycling. Healthy end-use demand for both residential and commercial recycled plastic is also essential for continued growth of non-bottle rigid plastic recycling.

¹⁵ Includes 1-7 small rigid plastic, see definitions in the methodology section.

With more stakeholders (e.g. consumer product goods companies, converters, legislators, and environmental non-profit organizations) demanding plastic circularity, or the recovery of plastic and prevention of waste, there is a need to highlight the energy savings in using post-consumer resin (PCR) to stimulate more demand for PCR. According to a 2018 life cycle impact report commissioned by the Association of Plastic Recyclers, use of PCR offers significant energy savings when compared to virgin resin.¹⁶ Illustrating the benefits in using recycled content stimulates demand, which can stimulate investments to shore up the domestic infrastructure (sorting and processing) and engage all to participate in recycling.

Demand for PCR is starting to grow, most prominently in Europe, but there are significant market disconnects. For example, PCR quality varies drastically and most of the demand is for the PCR that has near virgin plastic quality. Using PCR in applications that currently use highly engineered resin and packaging requires increased innovation in plastic recovery. Recyclers are dealing with more varied feedstock streams (varying types of packaging), while also trying to compete with more specialized virgin resin for use in new products. The required resources for producing PCR are growing, alongside the increased specialization of plastic applications and the increased variety of plastic products on the market.

Companies that put PCR in products are not yet widely recognized or rewarded for their greenhouse gas savings outside of environmental branding to a limited but growing segment of consumers. When more consumers reward companies that use PCR through their purchase of PCR containing products, we will likely see more drive for recycling and less plastic waste. Initiatives and policies designed to align the goals of diverting material from landfills and reducing greenhouse gas emissions are essential.

Three fundamental needs remain in order for non-bottle rigid plastic recycling to improve:

- **Enhance and develop infrastructure to sort and process residential non-bottle rigid plastic into segregated commodities**
 - Select reclaimers are setup to sort mixed rigid bales, but ultimately additional sorting at larger MRFs and secondary processing at MRFs unable to sort beyond PET and HDPE bottles is required to further segregate and consolidate the valuable rigid plastic beyond PET and HDPE bottles.
- **More demand to absorb the material currently collected (and the additional material with the potential to be collected)**
 - Given the economic competitiveness of virgin, without recognition of energy savings in material choices, demand will likely remain a challenge. Without demand there is a disincentive for improving the collection and processing infrastructure.
- **More education on what, where and why to recycle**
 - Once there is demand for recycled plastic by end users, and therefore those processing scrap plastic for those end users, there will still be a need to motivate consumers to take the action of recycling.

¹⁶ <https://plasticsrecycling.org/images/apr/2018-APR-Recycled-Resin-Report.pdf>.

HARMONIZATION OF RECYCLING EDUCATION & DESIGN FOR RECYCLING

We recommend that recycling education include more emphasis on buying recycled content products and improving the quality of the recycling stream. Quality can be enhanced by improving the original design of the product or package, as well as the handling and sorting practices for that package once the product has been used. With key tools like the **APR Design Guide® for Plastics Recyclability** and the **How2Recycle** label working in partnership, there has been positive movement in designing for recycling.¹⁷ However, with demand challenges for PCR, we recommend that future design goals strive for recyclability plus recycled content.

On the handling and sorting side of the system, we recommend clear, harmonized messaging. Many communities need support in determining what should go in the bin and resources to help them educate their residents. We recommend continued clarification and alignment on messaging and terminology across recycling organizations. Efforts from The **Recycling Partnership** along with the **Plastic Recycling Terms & Tools** initiative provide market based, research driven terms, images and messages.¹⁸

¹⁷ The APR Design Guide for Plastics Recyclability, <http://www.plasticsrecycling.org/apr-design-guide/apr-design-guide-home>; and, How2Recycle label - www.how2recycle.info.

¹⁸ <http://www.recycleyourplastics.org/termsandtools>.

The Plastics Division of the American Chemistry Council (ACC), which provided funding to More Recycling (MORE) to prepare this report, provides resources to assist communities, businesses and others in increasing awareness and education about the recycling of plastic bottles, containers, plastic bags, and film. MORE is a recognized expert in the field of plastics recycling and has been conducting recycling studies for over 27 years. This work has been conducted and evaluated in an objective manner by persons qualified to do so, using procedures generally accepted in the profession. For information about recycling non-bottle rigid plastics, visit www.AmericanChemistry.com/Plastics. Also, visit www.PlasticsMarkets.org, which is maintained by MORE, for a directory of scrap plastic buyers and suppliers and access to additional resources, including the Buy Recycled Products Directory. This report and others on plastic recycling can be found at www.MoreRecycling.com.

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