



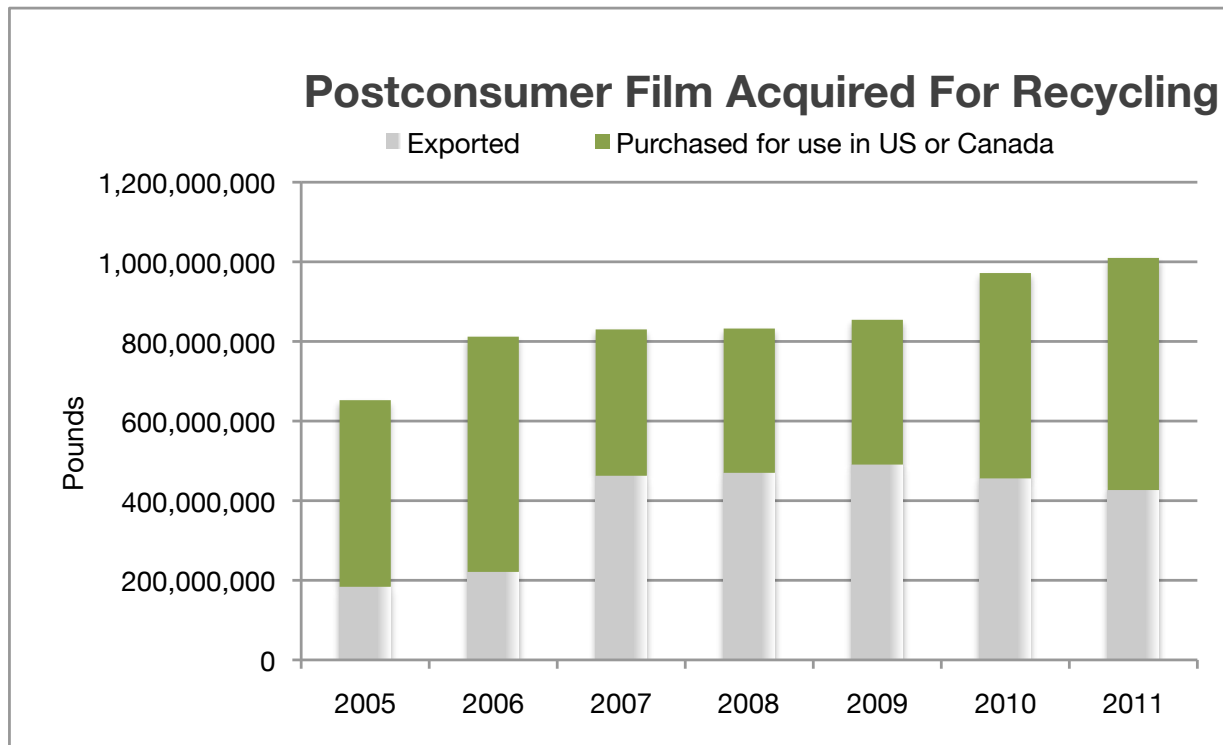
2011 National Postconsumer Plastic Bag & Film Recycling Report

Prepared by Moore Recycling Associates Inc. for the
American Chemistry Council

February 2013

Introduction

The 2011 National Postconsumer¹ Plastic Bag and Film Recycling Report is the seventh annual report on pounds of plastic bags and film² recovered in the United States for recycling. Research for this report was conducted by Moore Recycling Associates Inc. for the Plastics Division of the American Chemistry Council (ACC).



¹ Throughout this report the term “postconsumer” refers to used plastics that have served their intended purpose; this includes both plastics that have been used by consumers and plastics that have been used by businesses. Commercial materials are usually recovered outside of curbside or drop off collection programs and include items such as pallet wrap and other commercial packaging. The EPA defines postconsumer as a material or finished product that has served its intended use and has been diverted or recovered from the waste destined for disposal, having completed its life as a consumer item. In contrast, post-industrial material is defined by the EPA as materials generated in manufacturing and converting processes, such as manufacturing scrap and trimmings/cuttings. This report does not include post-industrial recycling.

² Generally in this report plastic bags, wraps and film will be referred to as “film.” Film is thin, flexible sheets of plastic. The majority of plastic films are made from polyethylene resin including high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

Executive Summary

Plastic bag and film recovery has increased 55 percent since 2005. Recovery of postconsumer film (which includes plastic bags and product wrap) grew to an estimated one billion pounds in 2011.

In order to determine an accurate estimate of pounds of bags and film recovered in 2011, both the domestic and export postconsumer film markets were surveyed. The information for this report is based on recovery data from 19 U.S. and 3 Canadian processors of postconsumer film and 37 companies that export postconsumer film.

From 2006-2009, more than half of the film recovered in the United States was sold to overseas markets; however, in 2010 that trend reversed when domestic sales exceeded overseas sales. Domestic sales continued to exceed foreign sales in 2011: U.S. and Canadian processors consumed approximately 58 percent of U.S.-recovered postconsumer film and bag material and the export market consumed the remaining 42 percent. Composite lumber manufacturers consumed the majority of domestically-processed material, with substantial growth in consumption in 2011. The film and sheet market consumed close to the same amount in 2011 as it did in 2010.

The total amount of postconsumer film collected for recycling in 2011 increased 4 percent over 2010. Clear Commercial Film continues to make up the majority of film collected for recycling but no longer appears to lead the growth in recovery and, based on pounds reported, may be declining. The amount of Mixed Film—including mixed color commercial material and postconsumer retail collected bags and wraps—is growing. The amount of Curbside Film and Other Film also increased in 2011 (see page 5 for category descriptions).

In 2011, the percentage of bags and sacks in Mixed Film bales, reported by reclaimers, was extremely varied (from a low of 12 percent to a high of 85 percent). Thus, there is great uncertainty in the total recovery of bags and sacks. But, by using the reported reclaimer average along with curbside and mixed film reported, our rough estimate is that 151 million pounds of bags and sacks were collected for recycling—representing a 19 percent increase from 2010.

Scrap value for postconsumer film was slightly higher on average in 2011 compared to 2010, with prices dipping towards the end of the year.

Methodology

Data on recovered postconsumer plastic bags and film is collected together with data on plastic bottles and non-bottle rigid plastics during the Postconsumer Plastic Recycling Survey. The basic methodology has not changed since the first report, although a category change is noted below. To ensure the most accurate information:

- Moore Recycling's markets database is continually updated to include current exporters and reclaimers of plastic scrap.
- Moore Recycling distributes a secure, confidential, online survey by email and follows up appropriately (email and/or phone) to collect the data.
- Moore Recycling vets the data through follow-up calls, speaking to other industry contacts and reviewing other sources of recycling industry information.

Markets Database

Moore Recycling continually updates an in-house database of plastic exporters, processors, reclaimers and key brokers. Moore Recycling Associates regularly receives new information for entry into the database from its work with ACC, the Association of Postconsumer Plastics Recyclers (APR), the Plastic Recycling Corporation of California (PRCC) and the National Association of PET Container Resources (NAPCOR), and inquiries from web sites PlasticsMarkets.org and PlasticFilmRecycling.org. Contacts are also identified through published market databases and conversations with suppliers, such as material recovery facilities (MRFs), and key reclaimers. Moore Recycling strives to ensure the database is as complete as possible, with a goal of identifying every exporter, processor, and reclaimer involved in postconsumer plastic recycling.

Data Collection & Analysis

Moore Recycling uses a web-based, custom-designed survey system to gather data. Every year Moore Recycling explores ways to improve the quality and timeliness of the survey. This year clarifying questions and a new category—Commercial Film (Mixed)—were added to the survey to improve the accuracy of data reporting for postconsumer bags, sacks, and wraps.

An email with a unique link and message is sent to each contact. After an adequate amount of response time has passed, Moore Recycling staff send follow-up emails and make telephone calls to retrieve data. This follow up process is intensive and can take weeks or months depending on responses. To encourage participation Moore Recycling offers free advertising on PlasticsMarkets.org to those who respond promptly.

All suitable, quality, verifiable data is entered in the online survey tool directly by the company being surveyed or by Moore Recycling staff when the survey is completed over the phone, by email, fax or text. As it is received, Moore Recycling staff review the data for accuracy and place follow up calls as needed. After completing data collection, Moore Recycling compiles the data and categorizes it based on the detail reported. The final data totals are reviewed, analyzed, and then reported with as much detail as possible while maintaining confidentiality. Describing as clearly as possible how the data is collected and what is and is not included in the survey helps provide readers with the transparency needed to cross-reference results with other industry data.

Film Categories

The 2011 survey questions specified pounds acquired within the following categories:

Commercial Film (Clear) = Clear, clean PE film including stretch wrap and poly bags

Commercial Film (Mixed) = Mixed color PE film—no postconsumer bags

Mixed Film = Mixed color, clean PE film including retail collected postconsumer bags, sacks, and wraps

Curbside Film = Mixed PE film generated at MRFs

Dirty Ag Film = From the ground—up to 50% contamination

Clean Ag Film = Dry and from uses that do not touch the ground with up to 10% contamination

Recovered film enters the market in various categories, and often includes a combination of baled HDPE, LDPE, and LLDPE resins. Stretch film is often collected alone or mixed with other polyethylene film, including postconsumer bags, sacks and wraps. Stretch film represents a significant majority of the postconsumer film recovered. Plastic bags are most often commingled with stretch film wrap and other retailer-generated scrap film for efficient collection at retail locations. Since a “bag only” bale is fairly rare, our methodology is to calculate the total recovery of bags by using a determined percentage of the Mixed Film, plus the total for Curbside Film. Curbside Film consists primarily of bags. To clarify, the reclaimers reported percentages of bags, the survey asked the following questions:

- Is the percentage of bags in Mixed Film: retail bags only or all bags and sacks (e.g., dry cleaner bags, bread bags, etc.)?
- What makes up the other percentage of Mixed Film bales: mostly stretch wrap, mostly postconsumer wrap (e.g., toilet paper wrap, case wrap), or a combination of the two?”

Historically, we determined the percentage of bags through an average of the percentages reported by reclaimers. The 2011 survey included the new subcategory—Commercial Film (Mixed Color)—in order to yield more precise totals for the recovery of postconsumer bags, sacks and wrap. In previous years, responders could report only through the category of Commercial Film, which specified clear material only, or Mixed Film, which may include postconsumer material such as retail bags and wraps. The 2011 survey requested data for Commercial Film (Mixed), which has no postconsumer bags, and Mixed Film, which includes retail-collected postconsumer bags, sacks, and wrap. This allowed for differentiation between commercial mixed color film without postconsumer content from mixed color that includes postconsumer material.

Findings

In 2011, a minimum of one billion pounds of film plastic was collected for recycling in the U.S. The breakdown between the amount of U.S.-sourced film consumed domestically and exported is as follows:

U.S. Postconsumer Film Acquired For Recycling

Year	Exported	Purchased for use in United States or Canada	Total (Pounds)
2011	426,738,000	583,023,000	1,009,761,000
2010	455,984,000	515,823,000	971,807,000
2009	490,718,000	363,659,000	854,377,000
2008	469,968,000	362,426,000	832,394,000
2007	462,611,000	367,569,000	830,180,000
2006	221,082,000	590,928,000	812,010,000
2005	183,701,000	468,776,000	652,477,000

2010 was the first year since 2006 in which the majority of recovered film was consumed by U.S. or Canadian processors. 2011 data shows the continued trend towards more domestic processing. The percent of material reclaimed in the U.S. or Canada increased from 53 to 58 percent of U.S.-sourced postconsumer film. The remainder was exported, primarily to China, for reprocessing into new products.

The survey was sent to 167 exporters. The export total was calculated using data from 37 exporters, which is five fewer than in 2010. Fluctuations in participation are as follows:

- Four new companies replied in 2011.
- Six reported zero film in 2011, after reporting film export data in previous years.
- At least twelve companies likely exported but did not participate; of these, four companies were likely large exporters of postconsumer film³.

Grades of U.S. Film Acquired for Recycling in 2011

The additional break out of Commercial Film (mixed color and clear) in the survey categories provides a higher degree of accuracy in recovery data, but creates new challenges in comparing data year-over-year. More accurate reporting is one reason for a decline in Commercial

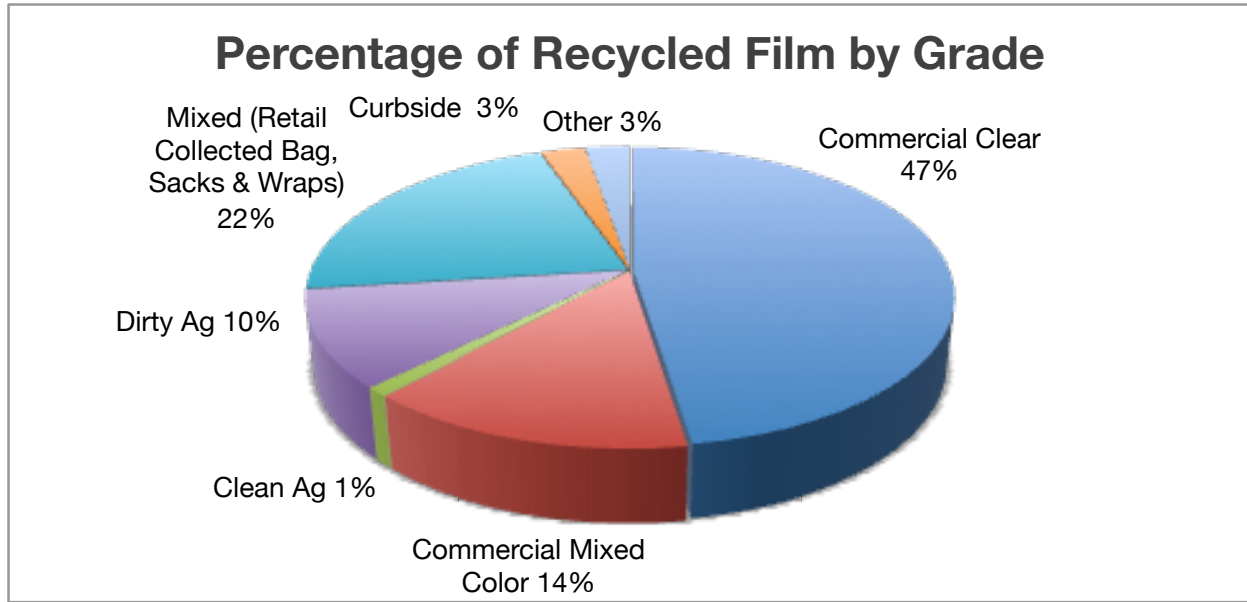
³ Moore Recycling Associates prioritizes data collection from exporters reported to move large volumes through U.S. ports as well as exporters identified by suppliers and other buyers as big players in the scrap marketplace. Despite the confidentiality in the survey process, some large retailers ask that their vendors not share their data, creating even more challenges in gathering recovery data.

Film (clear), another very significant factor is the consolidation in warehousing and a shift in where pallets are prepared for shipment to the store. As retailers place more focus on volume discounts and consolidating shipments to stores, the process of breaking down full pallets and building mixed pallets has shifted from manufacturers to retailer distribution centers (DCs). Thus, film collected in retailer supply chains is increasing, while film from manufacturer supply chains is decreasing. The result is less pure pallet wrap being generated and more mixed film because the pallet unwrapping occurring at the retailer DC's or stores is combined with other material.

The third potential reason for the decline in Commercial Clear is that data is difficult to gather and can depend on the buyer's source of material. Some suppliers feel that their film recovery data is too sensitive to share, thus their buyers will not report it. Thus, recovery data is subject to change based on fluctuations in participation. If more material is being collected at the retail or retailer's distribution center, but not reported, it means the survey captures fewer pounds than were actually collected for recycling.

Historically Moore Recycling has determined the amount of postconsumer bags recovered by adding the total for Curbside Film to a percentage of the Mixed Film, which consists of mostly retail collected bags and film. Reclaimers report the percentage of bags in Mixed Film. This year the percentages varied widely, from as low as 12 percent for one reclaimer to a high of 85 percent, with an average of 54 percent. Without consistent percentages reported by reclaimers there is great uncertainty in the total recovery of bags and sacks. Using the average percentage reported by reclaimers (54%), the Mixed Film containing postconsumer retail, and Curbside film, yields a total of 151 million pounds—a 19 percent increase from 2010 in the amount of bags and sacks collected for recycling. Most reclaimers reported that they consider bags to include all bags and sacks, not just retail bags. Most also reported that the rest of the bales consist of a combination of stretch wrap and postconsumer wrap.⁴

⁴ Bale audits have been proposed for 2013 and should yield a more accurate percentage for determining the amount of bags, sacks, and wraps in the Mixed Film bales.



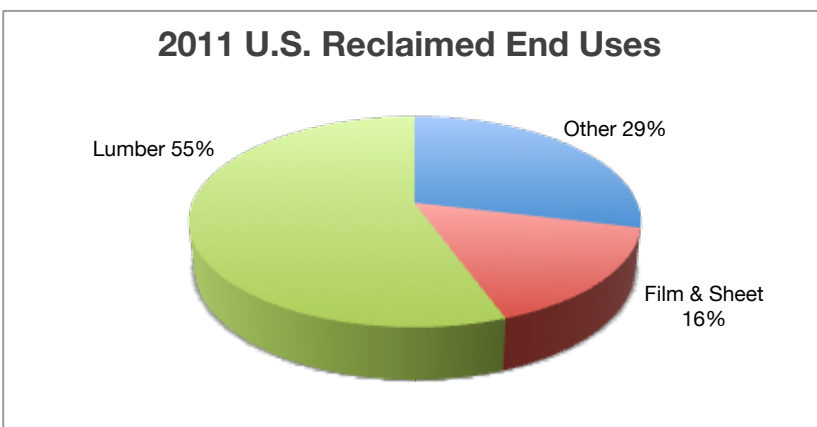
Both Other Film and Curbside Film collection increased in 2011. Other Film consists of a variety of material including boat wrap and polypropylene. The amount of Curbside Film sold to the export market increased, while the amount of curbside film sold to domestic markets decreased in 2011. There were two fewer domestic reclaimers and two additional exporters buying Curbside Film in 2011, compared to 2010. Only one exporter reported zero pounds in 2011 after reporting the purchase of Curbside Film in 2010. So, the primary reason that more Curbside Film is being exported appears to have been the decline in domestic demand.

Most domestic reclaimers express significant challenges processing Curbside Film. Historically, Curbside Film has been about one sixth or less of the value of Mixed Film, yet despite the low cost, there are few, if any, reclaimers cost-effectively processing Curbside Film. However, Mixed Film—which is often clean enough to bypass the costly washing stage of film reprocessing—continues to be cost effective. Currently, the cost to process Curbside Film often exceeds the value of the end product. A usable product is only possible when material recovery facilities (MRFs) put forth significant resources to avoid contamination from dirt, non-polyethylene plastic, glass, paper, and moisture.

One of the conundrums in plastic film recycling is that the film reclaimers that can handle fairly “dirty” material handle only one resin type (i.e., LDPE) and the reclaimers that can handle a mixture of resins (i.e., LDPE, LLDPE, and HDPE) cannot handle “dirty” material. The profit margins for reclamation are very tight; therefore reclaimers must be cognizant of processing costs (e.g., washing vs sortation) and thus tend to seek out specific grades of material.

Film Markets

The composite decking industry continues to be the lead U.S. market for postconsumer film and showed an increase in consumption of nearly 120 million pounds from 2010 to 2011. The amount of domestically reclaimed film going into film and sheet held at approximately 100.8 pounds in 2011.



Twenty-nine percent of the recovered film reported went into Other (miscellaneous) applications, such as garden products, crates, buckets, pallets, and piping. Some of the material in the Other category may also have gone into film, sheet, or composite decking because not all processors were able (or willing) to report their postconsumer resin end markets.⁵

Domestic Capacity & Utilization

Moore Recycling was able to document 835 million pounds U.S. processing capacity in 2011. More than 90% of this capacity is limited to fairly high-quality material, which means that the material can bypass the wash phase, or the stream is single resin rather than a combination of HDPE and LDPE. Despite the jump in domestic processing over the last several years, domestic processing capacity has not yet returned to the level seen in 2006, when the housing and construction markets were strong. In fact, the survey shows a slight decline in 2011 primarily because four companies that reported material in 2010, did not process postconsumer film in 2011.

In an attempt to identify new postconsumer processing capacity, the survey was sent to more than a dozen processors handling postindustrial material. As a result, four new companies reported processing postconsumer film in 2011. This additional capacity is less than the reported loss in capacity; therefore, there was a net decline in reported processing capacity in 2011 compared to 2010.

Moore Recycling Associates continues to seek appropriate contacts and request participation for future studies.

⁵ To protect the confidentiality of respondents, only end-uses in which there are more than 3 companies are listed.

Moore Recycling hypothesizes that the total capacity is probably higher than reported because there are several companies that did not process this material in 2011, but likely still have capacity on the ground and new companies are moving into postconsumer film reclamation.

The amount of material purchased by domestic processors went up 12 percent in 2011.

Breakdown of U.S. Processors by Capacity

Company Processing Size	Number of Companies
<10 million	4
10 - 30 million	7
>30 million	8

Utilization rates—even more challenging to estimate than capacity—were around 70 percent in 2011, based on two calculation methods: pounds reported into the various end markets and total purchased. Both methods of determining capacity utilization yielded close to 70 percent which is up 15 percent from 2010.

Despite reported tight supplies, higher prices, and challenges in consistent quality, many responders reported plans for upgrades to equipment as well as expansion, which could mean companies are banking on declining competition from the export market or increases in supply.

2011 Film Marketplace

Scrap Value

Prices for scrap film were up in 2011 compared to 2010. This was due in part to growth in consumption by the composite lumber market. Other markets, such as film and sheet, also paid more, primarily due to tight supply and some competition from the export market.

The spread between export and domestic pricing varies dramatically depending on the region and the commodity but appeared to shrink in 2011. For example, in the Eastern U.S., domestic prices offered for Mixed Film were consistently higher than those of export buyers. In the Western U.S., exporters generally offered higher prices than domestic buyers in 2010 and 2011; however, as noted above, the gap is closing; the average domestic price was higher in 2011 than 2010 and the average export price was slightly lower.

Collection

Most retailers that offer bag recycling to customers do so voluntarily. Many large chains have collected film and bags for over two decades—because they benefit from revenue from the scrap material, avoided disposal costs, and community goodwill. The scrap value for Mixed Film

has been strong enough that some retailers are willing to accept film and bags from smaller, neighboring businesses, in addition to their own customers. This Business-to-Business (B2B) model can be found in a growing number of locations. Large retailers have efficient reverse logistics. As their trucks return to distribution centers, they backhaul scrap film, cardboard and other materials. Most small to medium businesses do not have this option, thus recovery is less common in smaller businesses.

Recovery methods include:

1. Co-collection with cardboard, most commonly by private haulers
2. Drop off at a recycling center
3. Utilizing existing reverse logistics:
 - Business-to-Business: small neighboring businesses utilize larger retailer's recovery program
 - Backhaul after delivery of product by wholesale distributor (Some distributors offer their small businesses an after-delivery recycling service, accepting scrap material as they return to their distribution centers)

With the expansion of these recovery methods, more small to medium businesses will be able to contribute to the growth in film recovery because recyclable film exists in nearly every business.

Most consumer collection occurs through retail take back, which is both convenient and cost effective, especially for municipalities. The need for non-retail recycling depots will increase if fewer retailers offer bag and film collection due to bag bans or lack of knowledge about the market demand for recyclable film beyond bags.

In addition to retail collection, more dry cleaners are setting up bag and wrap collection for customers primarily through the services offered by dry cleaning product distributors. Companies like NS Farrington in North Carolina now backhaul film and bags from more than 150 dry cleaners across the state, offering a model for other distributors and dry cleaners.

Another new development in film and bag collection involves universities and colleges, especially those that participate in RecycleMania. With the 2013 RecycleMania kick off in February, the competition includes a new category: film plastic.

Curbside collection of bags, sacks, and wraps may be the easiest option for residents, and broad adoption of curbside collection by communities could result in greater recovery, but film is not an easy material for most material recovery facilities (MRFs) to process into a product with a decent scrap value. MRF processed film is often heavily contaminated. Including film in curbside programs often creates efficiency problems—thus added cost—especially for facilities that rely on rotating screens to sort containers from fiber. Film wraps around the screens, clogging equipment.

Commingled film is costly to process—at MRF and by reclaimers—since it requires significantly more processing such as further sortation and washing.

Successful recycling requires recycled material to have an end use and be deployed in that use; it is not just the act of collection and processing of material into new raw material. Therefore, growth in curbside collection of film is dependent on a robust market for pellet or products made from Curbside Film.

Quality

Most 2011 survey responders commented on the limited supply of good-quality material, including export buyers, which are increasingly demanding quality improvement. There are two primary types of contamination—contamination from general residue, occurring from collection practices that fail to keep the material clean and dry, and contamination from non-polyethylene film. The stream is continually changing, with innovations in packaging and new materials.

Conclusion

Based on the most conservative interpretation of survey responders' data and thorough vetting of data to prevent double counting, the recovery of postconsumer film increased by a minimum of four percent in 2011. Moore Recycling Associates reports that several significant exporters and at least one domestic reclaimer did not participate in the survey. Recovery is steadily increasing, but many reclaimers would like to see a more substantial increase of higher quality film, to meet their raw material needs.

Reclaimers that want more material want specific grades of material, such as a relatively clean mixture of HDPE and LDPE, or a pure stream of LDPE that may have some dirt or other non-plastic residue. The profit margins for reclamation are very tight, therefore reclaimers must be selective in adding reprocessing costs (e.g., washing, sortation) and must seek very specific grades of material.

Additional Information

This is the seventh year Moore Recycling Associates Inc. has conducted this survey and produced this report for the Plastics Division of the American Chemistry Council.

The Plastics Division of the American Chemistry Council provides resources to communities, businesses and consumers to assist them in increasing awareness and education of the recycling of plastic bags and film. Information can be found on the online web resource www.PlasticFilmRecycling.org.

The 2011 National Postconsumer Plastic Bag and Film Report has been prepared to provide information to parties interested in the recycling of plastics, in particular film and bag

materials. 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.

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