MORE RECYCLING

Prepared by More Recycling for the American Chemistry Council

2018 National Post-Consumer Plastic Bag & Film Recycling Report

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American Chemistry Council

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INTRODUCTION

This 2018 National Post-consumer Plastic Bag and Film Recycling Report is the 14th annual report on the pounds of post-consumer[1] plastic bags and film recovered[2] for recycling in the United States (U.S.). This research was conducted, and the report was finalized by More Recycling (MORE) for the Plastics Division of the American Chemistry Council (ACC). Throughout this report, plastic bags, wrap and film are generally referred to as "film," which is defined as thin, flexible sheets of plastic. The majority of plastic films are made from polyethylene (PE) resins, such as high-density polyethylene (HDPE), low-density polyethylene (LDPE), and linear low-density polyethylene (LLDPE). Those mentioned are the predominant forms included in this report.

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 manufacturing 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/conserve/smm/wastewise/web/html/buyq_a.html). This report uses EPA's definition throughout, 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 or 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.

EXECUTIVE SUMMARY

In 2018, at least 1 billion pounds of post-consumer film was recovered for recycling. After 11 straight years of steady growth resulting in a 54 percent increase in film recycling since 2005, the last two years have taken a different turn. With steep declines in exports in 2017 and 2018, the total pounds of film recovered for recycling dropped again in 2018. However, U.S. and Canadian processors, purchased 10 percent more film in 2018 than 2017, totaling the largest amount since the report was first compiled. The result in 2018 was an overall decrease of approximately 4.7 million pounds (or a 0.5% decrease) in the total film reported for recycling, compared to the 2017 total.

Figure 1: Purchases of U.S. Post-consumer Recovered Film

Sixty-nine percent of the 1 billion pounds were recovered for recycling by domestic buyers and 31 percent were exported. Export purchases were down by almost 19 percent in 2018. Domestic buyers provided some stabilization for the marketplace due to increased domestic purchasing while exports continued to drop. As with 2017, more material was recovered by domestic buyers than export buyers. In fact, domestic purchasing has increased for six straight years.

PE Clear Film continued to comprise the largest category of film recycled, with a total of 472 million pounds, and PE Retail Bags and Film was second at 242 million pounds.

METHODOLOGY

Data on recovered post-consumer plastic film is collected through a voluntary, annual plastic recycling survey that also gathers data on plastic bottles, non-bottle rigid plastics and other plastics.

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 sources of recycling industry information.

Data Collection and Analysis

MORE regularly 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 North American plastic.[3]

MORE uses a custom-designed, web-based survey system to gather data. Although the overall methodology has not changed since the first report, MORE seeks ways to improve the completeness and timeliness of survey responses with each iteration. These changes allow for better material flow tracking and assist with prevention of double counting. For example, MORE continues to expand questions related to non-mechanical recycling, as technology emerges in this space.

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 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. After data collection is complete, the data are compiled and categorized based on the detail reported.[4]

3 Through MORE's project work in the industry and the websites it manages—PlasticsMarkets.org, RecycleMorePlastic.org and directories on 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 materials recovery facilities (MRFs) and reclaimers.

4 MORE conducts the survey and takes steps to maintain the confidentiality of individual responses; employees follow procedures designed so that no individual company data are released, nor any specific category data that does not have at least three companies reporting.

The final data totals are reviewed, analyzed and reported with as much detail as possible without compromising the confidentiality of the responders' individual responses. In order to determine trends and identify anomalies that may require further vetting, the analysis includes year-to-year comparisons of 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, and what is and is not included in the survey, provides readers of this report with the transparency needed to cross-reference the results with other available industry data.

FILM CATEGORIES

The 2018 survey used the following material categories:

- **PE Clear Film** - Clear, clean polyethylene (PE) film from commercial sources, including stretch wrap and poly bags
- **PE Colored Film** - Mixed color PE film from commercial sources, including stretch wrap; no post-consumer bags
- **PE Agricultural Film** - Includes clean and dirty agricultural film. Dirty agricultural film has been in contact with the ground and may include up to 50 percent contamination (e.g., mulch film). Clean agricultural film has been used in applications that do not involve contact with the ground and may include up to 10 percent contamination (e.g., greenhouse film)
- **PE Retail Bag and Film** - Mixed color, clean PE film, including stretch wrap and retail collected post-consumer bags, sacks, and wraps
- **MRF Curbside Film** - Post-consumer PE Mixed film collected curbside and sorted at a MRF
- **Other PE Film** - A "catch-all" for PE film that does not fit in any of the categories above
- **Other Non-PE Film** - A "catch-all" for non-PE film that includes polypropylene (PP) and polyvinyl chloride (PVC)

Note: Other PE and Other Non-PE Film are reported as an aggregate category of Other Film for the purposes of this report.

DATA GAPS AND ASSUMPTIONS

Participation in the survey is voluntary and the reported data are based on the responses received. Many companies have limited resources to put towards participation in the survey, and some companies may choose not to respond due to their confidentiality policies or other reasons. Therefore, because there is not 100 percent participation, the presented totals represent the minimum amount of plastic film recovered for recycling and sold on the marketplace. Only data provided by North American reclaimers and exporters selling directly overseas, are included in the reported totals, unless MORE determines that data are missing in areas where substantive information from other reliable sources is available. 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 actual collection, along with new information about 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 from previous years and while taking into account the need to protect the confidentiality of the data from individual responses.

MORE tracks exporters' purchasing of plastic film through a number of industry resources. Except for the largest exporters, players in the export market come and go, and may change the type or mix of materials they purchase. Increased volatility in the export market began in 2017 with the National Sword policy in China, restricting the import of scrap materials. China's Blue Sky plan, intended to curb pollution through continued restrictions on the import of scrap plastic, took effect in 2018 and remains in effect.

In addition to the potential impact of non-responders, changes in how responders report pounds in the survey categories impact the totals reported year over year. There is some variability between responders reporting pounds in PE Retail Bag and Film and PE Colored Film. Also, responders may lump a mixture of film categories in Other PE Film rather than break out their purchased volumes into the individual PE film categories.

Determining the amount of consumer-generated post-consumer bags and wrap recovered for recycling is not straightforward. Currently, most of this category is collected for recycling via store drop-off programs, and most retailers combine consumer-returned bags and wrap with back-of-house operations commercial film for transport to markets that can reclaim a mixture of polyethylene film. These bales are reported by reclaimers and exporters in the PE Retail Bags and Film category. MORE estimates the recovery of post-consumer bags and wrap from consumers by adding a percentage of the PE Retail Bags and Film total to the total MRF Curbside Film. The percentage used is based on available bale audit data and is explained in more detail in the "Findings, Post-consumer Bags and Wrap Recycling" section below.

FINDINGS

Film Recycled

In 2018, the amount of plastic bags and film reported as recovered for recycling in the U.S. was 1 billion pounds, an increase of 54 percent since 2005. The 2018 numbers represent a decrease of 4.7 million pounds compared to 2017 values, and the lowest total reported for recycling since 2010. The upward trend of recycling from 2005 to 2016 has shifted toward a decrease the last two years with the most significant drop in 2017. Export totals peaked in 2016 and have dropped significantly. In 2018, export totals decreased by 70 million pounds, shifting export totals to a level not seen since before 2007.

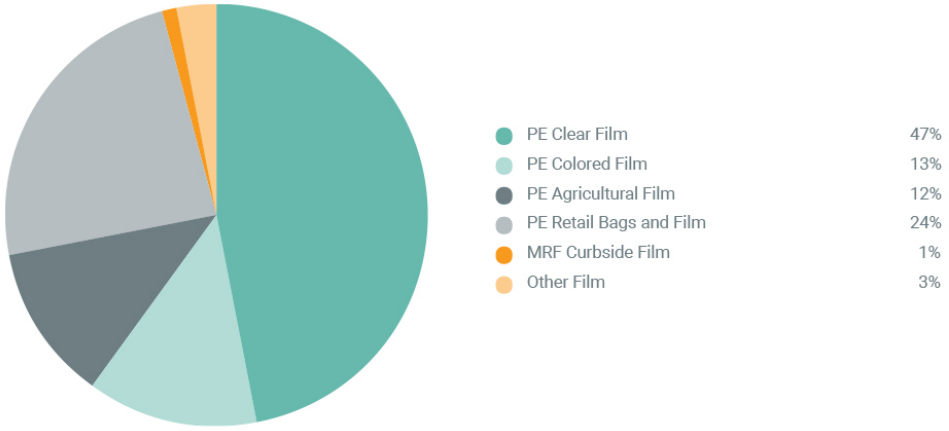
However, the amount of material reported as recycled by U.S. or Canadian processors increased by 10 percent from 2017, for the sixth consecutive year-over-year increase and the highest amount reported in the history of this report. Approximately 69 percent of the total quantity recovered was reclaimed in the U.S. or Canada, and the remainder was exported overseas.

Table 1: Table 1: US Post Consumer Film Recovered for Recycling

Year	Exported (Millions of Pounds)	Acquired for use in US or Canada (Millions of Pounds)	TOTAL (Millions of Pounds)
2005	183.7	468.8	652.5
2006	221.1	590.9	812.0
2007	462.6	367.6	830.2
2008	470.0	362.4	832.4
2009	490.7	363.7	854.4
2010	456.0	515.8	971.8
2011	426.7	583.0	1,009.8
2012	601.9	418.6	1,020.5
2013	656.3	479.7	1,136.1
2014	645.7	519.4	1,165.1
2015	622.5	576.6	1,199.1
2016	704.4	617.7	1,322.1
2017	377.6	629.1	1,006.7
2018	307.3	694.7	1,002.0

Depending on how and where it is collected, recovered film bales may contain combinations of HDPE, LDPE, and LLDPE resins or may contain a single resin. For example, stretch film (e.g., pallet wrap) is either collected separately and marketed as PE Clear Film, or it may be mixed with other polyethylene film—including post-consumer bags and wrap—and marketed as PE Retail Bags and Film. Stretch film represents a significant majority of the post-consumer film recovered.

Figure 2: 2018 Percentage of Pounds of Recovered Film by Category



PE Clear Film, the largest category of film recycled, had the most significant increase in overall percent recycled in 2018, going from 39 percent of the material recovered for recycling to 47 percent. PE Clear Film was the one category that saw an increase in domestic purchasing in 2018, while many of the other categories did not have domestic purchases to offset the decline of export purchases. Export purchasing, overall, dropped for all film categories except PE Retail Bags and Film. The increase in the PE Retail Bags and Film total was primarily due to new responders to the survey. U.S. and Canadian reclaimer purchasing dropped for all film categories except PE Clear Film and Other Film. The following categories all decreased in pounds reported: PE Colored Film, PE Agricultural Film, MRF Curbside Film and Other Film.

Table 2: 2018 Millions of Pounds of Recovered Film by Category

Recovered Film Category	Millions of Pounds Recovered in 2018	Change Since 2017	% Consumed by U.S. & Canadian Reclaimers
PE Clear Film	472.5	20%	61%
PE Colored Film	116.3	-22%	70%
PE Agricultural Film	133.7	-19%	97%
PE Retail Bags and Film	242.3	8%	75%
MRF Curbside Film	3.7	-80%	41%
Other Film	33.5	-41%	36%
Total	**1,002**	**-0.5%**	**69%**

Post-Consumer Bags and Wrap Recycling

MORE estimates that 187 million pounds of post-consumer bags and wrap generated from the residential sector were recovered for recycling in 2018, which is a 27 percent increase from 2017.[5] A private national bale audit in the retail sector provided the percentage of bags in PE Retail Bags and Film bales from 2012-2018.[6] Based on the findings of the bale audit study, this report assumes that approximately 76 percent of PE Retail Bags and Film bales are post-consumer bags and wrap, approximately 19 percent is stretch wrap, and the remainder is contamination. Approximately 33 percent of the post-consumer bags and wrap are retail carryout bags, and the remaining material is post-consumer packaging wrap and other bags. Given the historical variability in percentages, this is a conservative estimate of consumer-returned bags and wrap recovered for recycling.

Domestic Capacity and End Markets

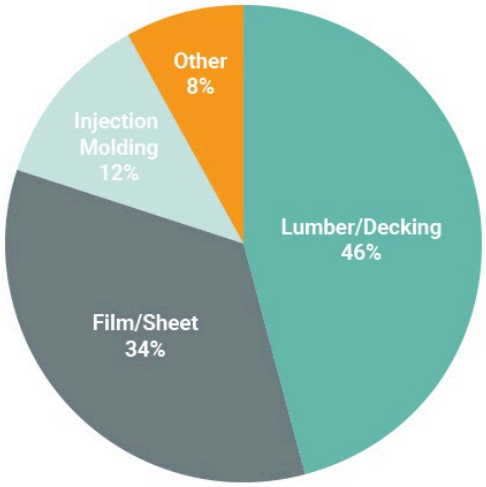
MORE estimates that in 2018 there was approximately 1.2 billion pounds of plastic film reclamation capacity in the U.S., which includes total capacity to wash or process unwashed material directly into regrind, agglomerate, pellets, or end products.[7] Most of the U.S. film processing capacity is for clean PE film, which can be used to make a new product without washing, or for single-resin film (e.g., LDPE only). There was an increase in domestic purchasing of U.S. sourced and non-U.S. sourced film by US reclaimers in 2018.

5 Consumer-returned plastic bags and wrap are commonly commingled with stretch film wrap and other retailer-generated scrap film for efficient collection at retail locations. Therefore, "bag only" bales, containing only consumer bags and wrap, are rare. Thus, as indicated in the Data Gaps and Assumptions section, the total amount of recovered post-consumer bags and packaging is defined in this study as the combined total of MRF Curbside Film with a specific percentage of the PE Retail Bags and Film bale.

6 Prior to the 2012 Report, MORE used an average of the percentages of bags in PE Retail Bags and Film bales reported by reclaimers. In addition to the private bale audit study, the Flexible Film Recycling Group (FFRG) conducted bag audits on material recovered during Wrap Recycling Action Program's (WRAP) educational campaigns in WI, WA, and CT to provide additional insight and assess the impacts of specific signage and education at the retail level on the quality and volume of recovered film. More information about WRAP reports, including bag audits, is available on PlasticFilmRecycling.org.

7 Capacity for processing post-consumer film often overlaps with capacity to process post-industrial film and in some cases bottles and non-bottle rigid plastics. The annual United States National Post-consumer Plastic Bottle Recycling Report and the annual National Post-consumer Non-bottle Rigid Plastic Recycling Report likely report some capacity that is also reported here. Thus, adding the non-bottle rigid, bottle, and film capacities from this report and the others could result in some double counting.

Figure 3: Reclaimed U.S. Post-Consumer Film: 2018 End Uses by U.S. or Canadian Reclaimers



The primary domestic end uses for plastic film include composite lumber/decking, film and sheet, and injection molding, which may include products such as pallets, crates, and buckets. Composite lumber/decking remains the dominant domestic end use market for post-consumer film.

The survey asked responders to characterize the 2018 market as compared to previous years. Similar to 2017, responders highlighted declining market values and the growing supply of scrap material available in the marketplace.

DISCUSSION

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

In addition to year-end survey data, MORE tracks the plastic recycling marketplace throughout the year. 2018 scrap film prices were low but slightly more stable than in 2017, which experienced a precipitous drop for all categories.

The fundamental challenges outlined in the 2017 Post-Consumer Film Report persist.

- Most of the domestic reclamation capacity is focused on clean, dry PE film or single resin material.
- The U.S. is not well-positioned to process all of the material available for recycling, including PE Retail Bags and Film and especially MRF Film.
- The return on investment in new capacity faces challenges given the cost of virgin resin, low importance placed on recycled content, or energy savings, and the low cost of disposal in America.

Although 2018 resulted in a modest decline in the overall volume of film recovered for recycling, it was a relatively stable year for film recycling compared to the previous year, largely due to growth in domestic purchasing of PE Clear Film. PE Retail Bags and Film recycling increased, primarily due to new responders to the survey. Survey responses show an increase of steady purchasing domestically from 2017 to 2018, with a drop in export purchases across repeat responders for PE Retail Bags and Film. Demand for PE Retail Bags and Film from the composite decking industry was critical in maintaining domestic purchasing totals in 2018. Based on feedback from reclaimers, retailers with quality controls in place and the ability to transport collected bags and wrap to their distribution centers for consolidation, were able to find domestic markets. The same is not true for small generators without reverse logistics or the ability to consolidate large quantities of material at distribution centers.

Provided there is more value placed on products with recycled content, there remains significant opportunity to optimize the collection system for commercial film given the volume of clean material available in nearly every business location. While some large generators of post-commercial film are baling material for direct transport to reclaimers, most small and mid-sized businesses are without a film recycling solution as networks to collect and consolidate material for market have disappeared. The vast distribution network that is ripe for reverse logistics, or the collection and consolidation of material following delivery of new products, is largely untapped due to low scrap value and low disposal costs. While the economic case to utilize existing networks and develop circular supply chains is very weak, the environmental case is very strong.

According to a 2018 life cycle impact report commissioned by the Association of Plastic Recyclers, the use of PCR offers significant energy savings when compared to virgin resin.[8] Illustrating the benefits in using recycled content stimulates demand, which can stimulate investments to shore up the domestic infrastructure and engage all to participate in recycling.

8 https://plasticsrecycling.org/images/apr/2018-APR-Recycled-Resin-Report.pdf.

RECOMMENDATIONS

Two fundamental needs remain to improve film recycling:

1) **INCREASE DEMAND**: **Value is placed on PCR use thus creating demand**

- Reclaimers are struggling to compete with virgin resin, including off-spec, which is dampening the market demand for PCR film. Without demand there is a disincentive for improving the collection and processing infrastructure. Without value on energy savings in material choices, demand will likely remain a challenge.
- Given projected economic competitiveness of virgin resin, more PCR usage will likely require a policy anchored in sustainability and reducing the environmental impact of a product. A key element should include incentives or requirements for recycled content minimums in new products, since using PCR is a way to reduce energy and greenhouse gas emissions. Such policy requires clear protocols to track and verify claims of life cycle impacts and post-consumer recycled content.

2) **IMPROVE SUPPLY: Incentives to encourage consumers to recycle right and recycle more**

- With sufficient demand for recycled film by end users, those processing film will invest in the infrastructure to meet that demand, but in order to help meet manufacturing specifications economically, it is still essential for material to be collected with a focus on quality.
- There is still a need to motivate consumers (general public and businesses) to take the action of recycling, using best practices for film.
    - Programs like the Wrap Recycling Action Program (WRAP) are poised to provide clear consumer education to support collection of quality material that can be used by end users in their products. Moreover, consumer education programs should incorporate a "Buy Recycled" component to further stimulate demand via consumer purchasing habits to fully close the loop on film packaging.

Stimulate PCR Demand

While the U.S. has some of the most reliable reporting on what actually happens to post-consumer plastic, a comprehensive system has not been developed to reward companies that complete the full process of recycling–buying PCR as feedstock for new products or buying products with recycled content. There is a need to recognize the environmental impact of PCR usage since it results in energy savings and reduced greenhouse gas emissions, as well as diversion from landfills, contributing to the circular use of plastics. Furthermore, with little oversight or verification of claims of recycled content[9], market inefficiencies persist. Companies making strides towards circularity or using recycled content may not realize a competitive advantage if the standards on recycled content are unclear or unverified.

9 For example, more oversight is likely needed to ensure the PCR used to meet requirements by California's Recycled Content Trash Bag Program is truly PCR and companies are not able to use post-industrial material and claim it as PCR.

To address some of the key challenges, industry groups are working together to celebrate companies creating new demand for PCR through the APR's Demand Champions Program. Other programs and resources are also emerging to reinforce recognition of companies entering circularity and using PCR or buying products with PCR. These are some of the many recycling market support activities across the country listed on the Information Exchange for Recycling Market Development.

Circularity in Action, a platform to support recycling market development, is a holistic resource intended to support public and private initiatives aimed at improving the recycling ecosystem in the U.S. and highlighting companies and organizations engaging in the circular economy. The Platform connects people and organizations with tools made available by government, industry and NGOs, to take key actions required to increase opportunities and demand for post-consumer material that are critical for successful recycling. The Platform not only provides tools that connect buyers and suppliers of PCR and showcase products made with PCR, but it also recognizes entities using PCR and highlights the environmental benefits associated with using PCR.

Improve Supply

Resources that support the alignment of value chains to increase opportunities and demand for post-consumer material and improve recycling are essential. The following resources support design for recycling, optimization of the collection infrastructure, and continued harmonization of recycling education to support supply.

PlasticFilmRecycling.org has been available to the public for more than 11 years, and the website received more than 2 million pageviews in 2019. Based on direct inquiries from users, site visitors seem eager for more information. Yet a large portion of society remains unaware of the fact that they can and should recycle a long list of household bags and wraps, beyond the carryout bag, at participating drop-off locations. Unfortunately, the number of drop-off locations is declining due to market conditions or in response to bag bans. In addition to the adoption of the How2Recycle label, brand owners that are stepping into circularity by using recycled content and contributing to the collection infrastructure through retail locations or local fulfillment centers are the real leaders in film recycling.

Collaboration among organizations is essential. The American Chemistry Council and its Flexible Film Recycling Group (FFRG) have provided the foundational information tools and metrics for the last decade and now there are more organizations engaged in improving the state of film recycling. Inconsistent messaging remains and consumers will likely continue to be confused about how best to recycle their film. There is an opportunity for enhanced coordination to educate consumers including businesses on how to recycle right and drive sustainable management of critical resources,

When key tools like the APR Design Guide® for Plastics Recyclability and the SPC How2Recycle label work in partnership to promote packaging that is readily recyclable and clearly labeled so that consumers know how to recycle it, there will be positive movement in designing for recycling. However, design guidelines and labels are only part of the solution. With demand challenges for PCR, we recommend that future design goals strive for recyclability plus use of recycled content.

ADDITIONAL INFORMATION

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 to increase awareness and education about the recycling of plastic bottles, containers, bags, and film. MORE is a recognized expert in the field of plastics recycling and has been conducting recycling studies for over 20 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. Visit www.PlasticFilmRecycling.org for updates on WRAP programs, including results from campaigns. MORE provides technical support for WRAP, which is primarily funded by ACC's Flexible Film Recycling Group. Also visit www.PlasticsMarkets.org, which is maintained by MORE, for information about additional markets and handling guidelines. This report and others on plastic recycling can be found at www.MoreRecycling.com.

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