

## Final Report

# Film Plastic in Georgia

Funded by the:  
Georgia Department of Community Affairs



No Solid Waste Trust Fund monies were used to support this project.

August 2009





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# Film Plastic in Georgia

## Georgia Department of Community Affairs

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# EXECUTIVE SUMMARY

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The Georgia Statewide Waste Characterization Study, conducted for the Georgia Department of Community Affairs (DCA) by R. W. Beck, Inc. in 2004-2005<sup>1</sup>, indicated that film plastic comprised 7.4 percent of municipal solid waste (MSW) disposed in the State of Georgia (State) landfills by weight, the fourth most abundant material. In that year, an estimated 497,325 tons of film plastic was disposed in State MSW landfills, worth an estimated \$50 million assuming an average price of five cents per pound. To determine the potential to divert this material from disposal, DCA commissioned this study to evaluate 1) the amount and key sources of film plastic in Georgia, 2) the existing recovery infrastructure for film plastic, and 3) challenges and opportunities for recovery. Based on these findings, as well as research into approaches that have been implemented elsewhere, the report concludes with recommended strategies to increase recovery of film plastic in Georgia.

## Sources of Film Plastic

One of the few studies that quantifies the proportion of film plastic by source is a waste composition study conducted for the California Integrated Waste Management Board in 2003<sup>2</sup>. This study estimated that 24 percent of the total film plastic disposed in that State was unrecoverable trash bags (from both residents and businesses). Approximately 73.7 percent of the remaining film plastic was from business and industry while 26.3 percent was from residents. When these estimates are applied to Georgia's 2004 estimate of 497,325 tons of film plastic per year, it is estimated that 119,358 tons is unrecoverable plastic trash bags, 278,502 tons is non-trash bag film plastic from business and industry, and 99,465 tons is non-trash bag film plastic from the residential sector.

Because nearly three-quarters of the potentially recoverable (non-trash bag) film plastic disposed in the State comes from business and industry based on these data, R. W. Beck studied the likely sources of commercial and industrial film plastic in Georgia in more detail. To do this, we researched the waste composition of different business types from other studies and applied these composition data to economic data in Georgia (number of employees per business type). The results suggest that four business types may generate a total of nearly 100,000 tons of film plastic per year across the State. As shown in Table ES-1, these are business services, restaurants, food stores, and other retail trade.

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<sup>1</sup> Georgia Statewide Waste Characterization Study, Georgia Department of Community Affairs, prepared by R. W. Beck, Inc. June 2005.

<sup>2</sup> Statewide Waste Characterization Study, California Integrated Waste Management Board, prepared by Cascadia Consulting Group, Inc. December 2004

**Table ES-1**  
**Estimated Film Plastic Disposed by Business Types in Georgia**

Business Type	Tons MSW/ Empl. /Yr [1]	% Film Plastic in Disposed MSW [1]	Employees in GA [2]	Tons Film Plastic Disp/Yr.	Rank by Tons Disposed per Business Type
Services - Business Services	1.7	6.4%	414,936	34,762	1
Retail Trade - Restaurants	3.1	3.5%	309,779	33,611	2
Retail Trade - Food Store	2.9	4.7%	128,658	17,536	3
Retail Trade - Other	1.9	4.7%	202,341	13,913	4

[1] Based on data compiled by the California Integrated Waste Management Board during their 1999 Waste Characterization Study for disposed waste, except for restaurants, retail trade - food stores, durable goods wholesalers, hotels, and malls, which were based on a subsequent study in 2005 that separately characterized trash bags, retail bags, and other film (trash bags removed from data in this table).

[2] Based on County Business Patterns (2006), with the exception of Agriculture employment, which was obtained from the Dept. of Agriculture (2002).

In addition to determining which business types in the State may generate large amounts of film plastic as a whole, R. W. Beck researched which business types may have individual facilities that may generate large amounts. For example, although businesses classified as “business services” throughout Georgia are estimated to dispose of nearly 34,762 tons of film plastic a year, more than any other business type, because there are over 20,000 listed “business service” locations in the State, the average location is only estimated to dispose of 1.7 tons per year. Table ES-2 shows which ten business types are most likely to have individual locations that dispose of significant amounts of film plastic in the State.

**Table ES-2**  
**Estimated Film Plastic Disposed by Individual Location in Georgia**

Industry	Annual Tonnage Disposed by Business Type	Number of Locations	Tonnage per Locations per Year	Rank by Tons Disposed per Location
Malls <sup>1</sup>	4,734	54	87.67	1
Manufacturing - Food/Kindred	8,936	504	17.73	2
Services - Medical/Health (hosp. nursing homes)	8,034	1,595	5.04	3
Retail Trade - Food Store	17,536	4,989	3.51	4
Manufacturing - Paper/Allied	540	193	2.80	5
Manufacturing - Furniture/Fixtures	711	316	2.25	6
Retail Trade - Restaurants	33,611	15,859	2.12	7
Services - Business Services	34,762	20,494	1.70	8
Retail Trade - General Merchandise Stores	2,820	1,809	1.56	9
Retail Trade - Building Material and Garden	4,136	2,774	1.49	10

[1] Malls are a collection of Retail Trade – Other and Retail Trade – General Merchandise stores in one location and not a separate “industry” *per se*.

Figure ES-1 shows the locations with the largest number of employees within each of the five business types that are identified as likely to have the most film plastic per location in Table ES-2. In addition, restaurants (ranked #7 in estimated average tons per location) are shown because, in total, restaurants are projected to generate the second highest total amount of film plastic per year. These are projected to be some of the largest film plastic sources in the State. About half of the potentially large generators of film plastic are located within a 75-mile radius of metro Atlanta with a couple of facilities in several other large cities in the State. The exception is the food and kindred product manufacturers, which tend to be spread more broadly throughout the State.

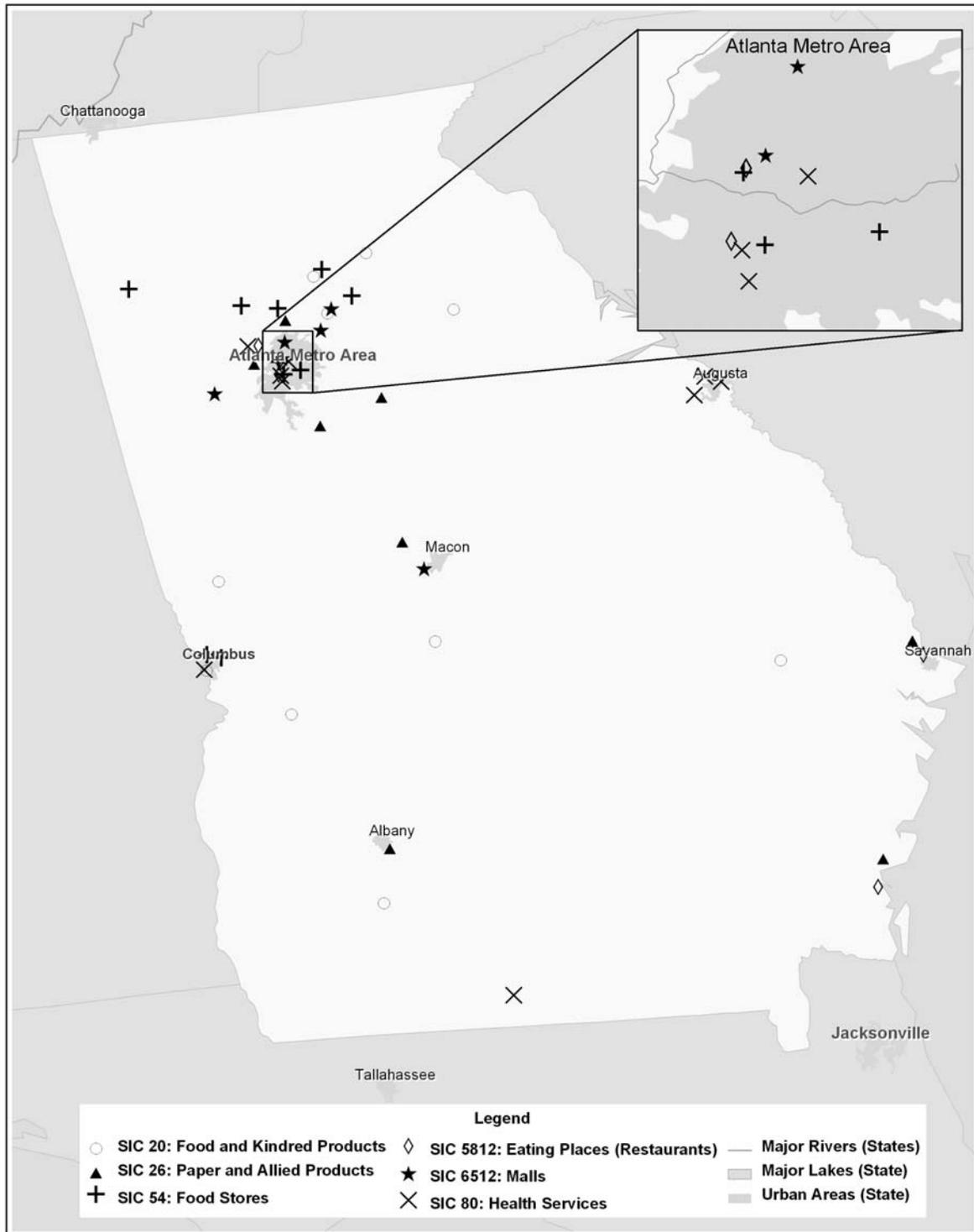


Figure ES-1 Potentially Large Generators of Film Plastic in Georgia

## Film Plastic Recycling Infrastructure

Although the amount of film that is collected for recycling in the U.S. has not been consistently tracked, the American Chemistry Council reports that at least 830 million pounds (or 415,000 tons) of U.S. film was recovered in 2007. Most film plastic collection programs in Georgia focus on commercial and industrial sources rather than residential sources. A couple of local governments include film plastic in their curbside programs and a few more in their drop-off programs, however, more residents have access to film plastic collection at grocery stores or other retail locations.

A number of commercial and industrial facilities that generate large quantities of cardboard (OCC), particularly those that have centralized warehouse and distribution centers, are also collecting film plastic with their OCC for recycling. These businesses often bale their own OCC. In some cases, they may bale film plastics as well, or they may stuff film plastics into larger bags to be baled after back-haul to a central distribution center.

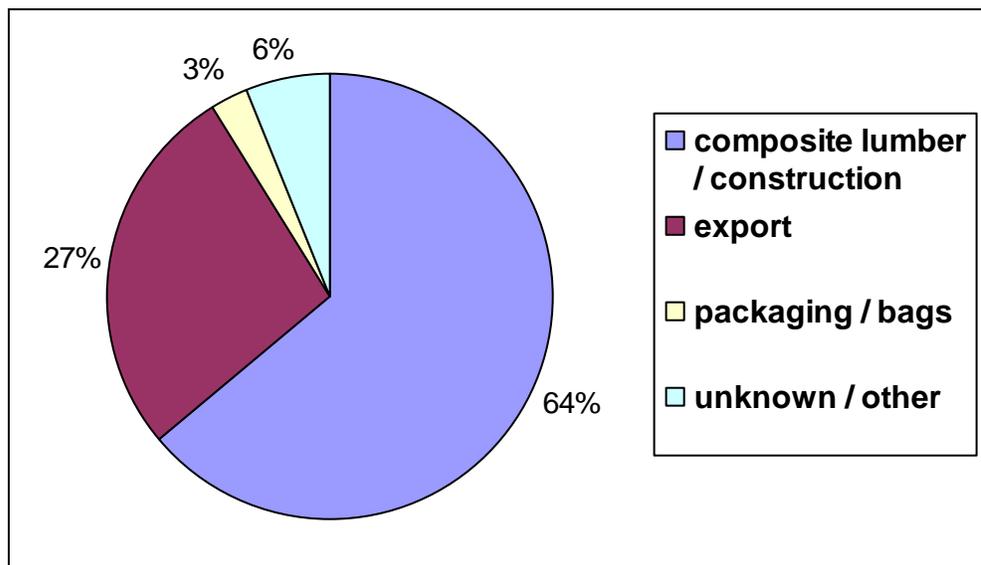
Several public and private Recovered Materials Processing Facilities (RMPFs) reportedly accept film plastic, either pre-sorted or in recyclable-rich loads from which they pull out cardboard, film plastic, and other recyclables. Once film plastic is recovered and baled, it goes to reclaimers or end-users for additional processing and marketing or reuse. Table ES-3 lists companies that were recycling film plastic back to a form ready for reuse (“reclaimers”) as of early 2009 that are located within 500 miles of Atlanta. Although this list is not comprehensive, it is believed to represent the primary markets that are available for Georgia film plastic.

Table ES-3  
Film Reclaimers Serving Georgia

Company	Location	Commercial	Return-to-Retail	Curbside	Agricultural
Nemo Plastics	Atlanta, GA	✓			
Cycle Tex	Dalton, GA; Rome GA	✓			
Jerico Plastic Industries	Greensboro, GA	✓			
Sundance Products Group	Gainesville, GA	✓			
Webster Industries	Montgomery, AL	✓	✓		
ITW Angleboard	Darlington, SC	✓			
Trex	Winchester, VA	✓	✓	✓	✓
Mountain Valley Recycling	Morristown, TN	✓	✓		✓
Hillex Poly	Mt. Vernon, IN	✓	✓	✓	✓
RKO Industries	LaBelle, FL				✓
AERT	Lowell, AR	✓	✓	✓	✓

Nationally, the majority of recycled film goes to composite lumber producers, as shown in Figure ES-2. A large percentage of recovered film plastic, particularly off

the West Coast of the United States was going to Asia for recycling. Demand by all markets slowed in 2008 as a result of the economic downturn.



Source: American Chemistry Council – Plastics Division “2006 National Post-Consumer Recycled Plastic Bag and Film Report

Figure ES-2: End Use of Film Collected for Recycling in the United States

## Film Plastic Recycling Challenges and Opportunities

The research performed for this project, which included surveys with dozens of generators, collectors, processors, and end users of film plastic, led to the following conclusions about challenges and opportunities related to recycling film plastic.

- Film plastic is likely to be more concentrated at businesses, especially certain types of businesses, than at residences. As a result, it may be more efficient to target these generators for collection programs.
- Because film plastic is lightweight, it can be inefficient to store, handle, and ship when loose. Thus, if a generator does not have sufficient quantity or space, or the capability to bale the material, handling film plastic can be a challenge.
- Also, because it is lightweight, generators may not perceive that diverting film plastic will result in significant waste disposal cost reductions (which are typically paid by the ton).
- Contamination by labels, adhesives, tapes, printing, and foam packing materials can reduce the marketability of film plastic, especially when demand is low. Contamination can be a larger proportion by weight of the total load than for other material because the film plastic itself is lightweight.
- Sorting film plastic is typically done by hand due to the variation in film size, weight, shape, and agglomeration with other films that limits the use of mechanical sorting. This can be labor intensive and so generators and processors may be required to separate and distinguish film plastic types before it is baled and shipped to a reclaimer.

- As with other commodities, in order for film to go to the highest recycled product use and be of the highest value, it needs to be separated by resin type (LDPE/LLDPE, HDPE, PP, and other resin types separated from each other). Because film plastic is not required to be labeled by resin type like plastic containers (and often is not), it can be difficult to identify resin type. As a result, for many generators, it may be difficult to sort film plastic to access the highest value markets.
- Declines in commodity prices, such as that experienced in late 2008, make recovery of film plastics less attractive. For example, one of the food manufacturers surveyed reportedly had begun to look into recovering film plastic from their operations but sudden price dips resulted in less interest on the part of the processor.

With regard to residential recycling of film plastic, our research led to the following conclusions.

- Residents' tend to have difficulty differentiating between recyclable and non-recyclable film, especially if the film plastic accepted in the program goes beyond retail bags, drycleaner bags, and newspaper sleeves.
- Curbside recycling of film plastic has been successful in several programs throughout the United States and Canada, particularly where film can be included with fiber bin in two-stream manual sort systems such as in several programs in Ontario. However, the collection and processing infrastructure for residentially generated recyclables in the State of Georgia is moving toward a single-stream system to increase recovery of fiber and containers. The collection and processing infrastructure used for single stream residential recycling does not easily accommodate film plastic.
- Many residents are effectively served through take back programs for film plastics at retailers. These programs tend to be convenient because collection locations are often at retail outlets, such as grocery stores, where residents are going anyway. In many cases, these programs are limited to plastic bags but some do take other types of recyclable film plastic. Even in these conveniently located programs, participation is likely to be lower than in a curbside program; however, material is likely to be cleaner than that collected at the curb.

With regard to recycling of film plastic from the commercial and industrial sector, our research led to the following conclusions.

- Most generating businesses do not know how much or the type of film plastic they generate.
- Some generators, such as retail stores, generate fairly significant quantities of uncontaminated film plastic at one time (e.g., when a shipment arrives and merchandise is set out in the store). This presents an opportunity to recycle consistent and clean material on a periodic basis, which may be more efficient than having to clean material and ship or bale material on a continual basis.
- Some locations, such as large retail stores, have the ability to bale their recyclables on site, and in many instances can include different types of materials in one bale. This allows the generator to densify materials on site, reducing storage and shipping concerns associated with loose film plastic.

- Other retailers that generate large quantities of cardboard may be able to include film plastic in their program, possibly even in the same bales. These businesses may not generate enough film plastic or may have other limitations that prevent them from sorting and baling film plastic on-site but they may be able to send commercial solid waste loads that primarily contain clean and dry fiber and film plastic to RMPFs in the State for sorting and baling of film plastic.

Based on surveys with potential generators in the business types identified, R.W. Beck also characterized challenges and opportunities related to specific business types, which are described in more detail in this report.

## Strategies

A first step to increasing diversion of film plastic from disposal in Georgia is to establish reasonable goals and an approach to measure progress towards these goals. The State of Georgia has a goal to recycle 16 percent of plastic by 2012 and 20 percent by 2017. The State and stakeholders, especially plastic recyclers, should revisit the statewide recycling goal set for plastic as a whole and determine whether and how it should be adjusted to account for film plastic. The State needs to have a way to measure the progress toward this goal, which may include incorporation of film plastic into existing recycling reporting systems, such as RETRAC (the State's electronic reporting system for solid waste management and recycling activity) and by updating the statewide waste characterization study to determine changes in composition of waste disposed.

This study indicates that the commercial and industrial sectors are likely to be the most feasible and cost effective sources of film plastic for recycling. It also identifies the business types and individual locations where significant amounts of film plastic are likely to be generated in the State. However, before investing resources to implement these strategies, it would be worthwhile to conduct generator based characterization studies or audits to ensure that composition of waste from an individual business is a worthwhile target for recycling strategies. Specific strategies for diverting more film plastic from disposal are identified below and are discussed in more detail in Section 5.

## Education and Information Programs

- Incorporate recycling of film plastic into statewide recycling information.
- Target high generators for training about evaluating and implementing the potential to divert film plastic.
- Ensure that generators have access to information about film plastic recycling options.
- Sponsor focused pilot programs by business type.

## Collection and Processing Infrastructure

- Work with recycling hubs to determine the best way to collect and process film plastic in a way that maximizes recovery but does not interfere with the single-stream processing equipment or the quality of other materials.
- Conduct generator based characterization studies or audits to identify large generators.
- Work with larger generators to build infrastructure to divert film plastic.
- Work with retailers to expand collection locations.
- Work with national and regional corporations that have a “green” initiative.
- Work with companies baling OCC to add film plastic.
- Encourage businesses to work with vendors to take film plastic that they deliver back for recovery.
- Work with malls and/or anchor stores at malls to aggregate and bale film plastic from individual stores and contract with a collector and recycler.
- Work with local governments that may be in a position to develop collection infrastructure using their own forces or through a contractor.
- Determine whether it is common practice for food manufacturers to discard remaining film plastic on a roll if a full “run” cannot be completed.
- Create drop-off points for clean agricultural film in highly agricultural portions of the State.

## Market Development

- Develop State purchasing preferences for products made with recycled film plastic.
- Add products made with recycled film plastic and/or equipment to handle film plastic for recycling to State contracts.
- Work with the manufacturers and the businesses that use film plastic to develop markets.

## Potential Partnerships

- Work with business associations in the State.
- Work with collector and processors of recyclables.
- Enlist the expertise and of end users.
- Collaborate with landfills and transfer station operators.



# Section 1 INTRODUCTION

The Georgia Statewide Waste Characterization Study, conducted for the Georgia Department of Community Affairs (DCA) by R.W. Beck, Inc. in 2004-2005, indicated that film plastic, defined as garbage bags, retail bags, cereal bags, sheet plastic, shrink wrap, tarping, and other non-rigid plastic, comprised 7.4 percent of municipal solid waste (MSW) disposed by weight in Georgia landfills. Based on this study, film plastic was the fourth most abundant material by weight (Table 1-1) disposed in the State of Georgia. The results of the Georgia Statewide Characterization Study are consistent with results from other states that estimate 5 to 8 percent of MSW disposed is film plastic. In the year that the study was conducted in Georgia, 2004-2005, an estimated 497,325 tons of film plastic was disposed in MSW. Assuming an average value of 5 cents per pound, the potential value of the film plastic being disposed in Georgia is estimated at nearly \$50 million per year.

**Table 1-1  
Statewide Aggregate Landfilled MSW Composition Detail (Weight Percent)**

Group	Material	Tons Disposed	Statewide Aggregated Average
<b>Paper</b>	Newspaper	322,001	4.8%
	Corrugated Cardboard	733,866	11.0%
	Office	225,580	3.4%
	Magazine/Glossy	176,437	2.6%
	Paperboard	228,270	3.4%
	Mixed (Other Recyclable)	199,640	3.0%
	Other (Non-recyclable)	699,178	10.5%
	<b>Total Paper</b>	<b>2,584,972</b>	<b>38.7%</b>
<b>Plastic</b>	#1 PET Bottles	89,577	1.3%
	#2 HDPE Bottles	73,460	1.1%
	#3-#7 Bottles	12,552	0.2%
	Expanded Polystyrene	94,182	1.4%
	Film Plastic <sup>3</sup>	497,325	7.4%
	Other Rigid Plastic	291,886	4.4%
	<b>Total Plastic</b>	<b>1,058,981</b>	<b>15.8%</b>

<sup>3</sup> There has been a rise in the plastic content in the disposed waste stream for many years, as more and more products are manufactured using plastics. MSW disposal contributions from plastic bags and other film plastics are commonly ranging from 5 to 8 percent as published in recent reports for New York City, Iowa, Pennsylvania, and Washington.

## Section 1

Group	Material	Tons Disposed	Statewide Aggregated Average
Glass	Clear	112,492	1.7%
	Green	27,471	0.4%
	Amber	79,405	1.2%
	Other	25,195	0.4%
	<b>Total Glass</b>	<b>244,564</b>	<b>3.7%</b>
Metal	Steel Cans	89,680	1.3%
	Aluminum Cans	48,148	0.7%
	Other Ferrous	175,449	2.6%
	Other Non-Ferrous	50,134	0.7%
	<b>Total Metal</b>	<b>363,410</b>	<b>5.4%</b>
Organics	Yard Waste	177,880	2.7%
	Wood (non-C&D)	125,174	1.9%
	Food Waste	800,329	12.0%
	Textiles	267,119	4.0%
	Diapers	170,308	2.5%
	Fines	187,011	2.8%
	Other Organics	83,945	1.3%
<b>Total Organic</b>	<b>1,811,767</b>	<b>27.1%</b>	
C&D	Drywall	24,747	0.4%
	Wood	168,764	2.5%
	Inerts	29,052	0.4%
	Carpet	94,514	1.4%
	Other C&D	82,076	1.2%
	<b>Total C&amp;D</b>	<b>399,154</b>	<b>6.0%</b>
Inorganics	Televisions	3,785	0.1%
	Computers	8,720	0.1%
	Other Electronics	117,286	1.8%
	Tires	15,324	0.2%
	HHW	26,454	0.4%
	Other Inorganics	50,584	0.8%
<b>Total Inorganics</b>	<b>222,152</b>	<b>3.3%</b>	
<b>TOTAL</b>		<b>6,685,002</b>	<b>100.0%</b>

Source: Georgia Statewide Waste Characterization Study, Georgia Department of Community Affairs, prepared by R. W. Beck, Inc. June 2005.

In addition to its prevalence in landfills in Georgia, film plastic is a visible component of litter. A roadside litter assessment conducted in 2008 by R.W. Beck, Inc. for DCA indicates that plastic bags comprised 2 percent of the litter items counted statewide; however, other categories of litter (i.e. “candy, gum, snack, wrappers”) are likely to include some film plastic as well.

As a result of the impact of film plastic on solid waste management in Georgia and because of its potential value as a feedstock for industry, DCA has commissioned this study to evaluate the potential to divert film plastic from disposal in the State. This report documents findings regarding the amount and key sources of film plastic in Georgia (Section 2), the existing recovery infrastructure (Section 3), and challenges and opportunities for recovery in the State (Section 4). Based on these findings, as well as research into approaches that have been implemented elsewhere, R.W. Beck recommends strategies to increase recovery of film plastic in Georgia (Section 5).



## Section 2

# SOURCES OF FILM PLASTIC IN GEORGIA

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One of the few recent studies that identify the relative proportions of film plastic coming from the residential sector and from the commercial and industrial sector is the Statewide Waste Characterization Study conducted for the California Integrated Waste Management Board in 2003<sup>4</sup>. This study estimated that 73 percent of the film plastic in the waste stream comes from the commercial/industrial sector and 27 percent from the residential sector. An estimated 24 percent of the film plastic was characterized as unrecoverable trash bags coming from both sectors, leaving an estimated 56 percent of the total film plastic in the waste stream as non-trash bag film plastic from the commercial and industrial sector and 20 percent as non-trash bag film plastic from the residential sector as shown in Table 2-1.

**Table 2-1**  
**Estimate of Tons of Film Plastic from Each Sector in Georgia**

Sector	Percent of Total <sup>1</sup>	Estimated Tons (2004)
Commercial And Industrial Sector	56	278,502
Residential	20	99,465
Trash Bags	24	119,358
Total	100	497,325 <sup>2</sup>

[1] Statewide Waste Characterization Study, California Integrated Waste Management Board, prepared by Cascadia Consulting Group, Inc. December 2004.

[2] Georgia Statewide Waste Characterization Study, Georgia Department of Community Affairs, prepared by R. W. Beck, Inc. June 2005.

Because nearly three times the amount of film plastic is projected to come from the commercial and industrial sector as the residential sector, and because commercial and industrial film plastic is likely to be concentrated in fewer locations and thus easier to recover than the residential film plastic, R.W. Beck conducted a further analysis to determine which individual business types and individual facilities in the State may generate film plastic in large amounts, and thus may be good targets for diversion strategies. To do this, R.W. Beck reviewed the literature to identify the waste composition of different business types, the amount of film plastic likely to be generated per employee, and applied these composition data to businesses in Georgia.

Again, one of the best sources of data about the composition of waste generated by individual business types comes from the State of California, which conducted a waste composition analysis for different types of commercial and industrial generators in 1999 and 2005. These data include both the average amount of total waste disposed per employee for each business type and the composition of the waste disposed for 39 groupings of solid waste generators. R. W. Beck applied the California data to the

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<sup>4</sup> Statewide Waste Characterization Study, California Integrated Waste Management Board, prepared by Cascadia Consulting Group, Inc. December 2004

## Section 2

Georgia business statistics to estimate which Georgia business types are likely to contribute most significantly to the film plastic in the State. By using the following formula, R. W. Beck arrived at film plastic estimates for each of the business types for which composition data were available from California.

**Per-employee waste generation x percent film plastic x Georgia-specific employment for that industry**

The results, shown in Table 2-2, suggest that four business types—business services, restaurants, food stores, and other retail trade—may generate a total of nearly 100,000 tons of film plastic per year in Georgia.

**Table 2-2  
Estimated Film Plastic Disposed by Business Types in Georgia**

Business Type	Tons MSW Disposed/ Emp/Yr [1]	% Film Plastic [1]	# Employees in GA [2]	Tons Film Plastic/Yr	Rank
Services - Business Services	1.7	6.4%	414,936	34,762	1
Retail Trade - Restaurants	3.1	3.5%	309,779	33,611	2
Retail Trade - Food Store	2.9	4.7%	128,658	17,536	3
Retail Trade - Other	1.9	4.7%	202,341	13,913	4
Manufacturing - Food/Kindred	1.6	12.5%	58,027	8,936	5
Services - Medical/Health (hosp. nursing homes)	1.5	3.4%	204,582	8,034	6
Malls [3]				4,734	7
Trucking and Warehousing	1.9	2.9%	110,414	4,685	8
Retail Trade - Building Material and Garden	3.3	3.5%	46,502	4,136	9
Transportation - Other	1.3	8.6%	44,143	3,800	10
Retail Trade - General Merchandise Stores	0.3	13.6%	89,772	2,820	11
Wholesale Trade - Durable Goods	0.9	5.1%	60,534	2,779	12
Services - Education	0.8	4.0%	69,787	1,884	13
Retail Trade - Automotive Dealers & Service Station	0.6	3.5%	104,652	1,720	14
Services - Hotels/Lodging	2.1	2.0%	44,866	1,692	15
Wholesale Trade - Nondurable Goods	0.9	8.0%	20,302	1,126	16
Manufacturing - Lumber and Wood Products	3.1	1.2%	35,993	1,031	17
Agriculture	0.9	1.6%	67,916	753	18
Manufacturing - Furniture/Fixtures	2.4	3.8%	10,130	711	19
Manufacturing - Printing/Publishing	0.8	3.2%	35,219	694	20

**SOURCES OF FILM PLASTIC IN GEORGIA**

Business Type	Tons MSW Disposed/ Emp//Yr [1]	% Film Plastic [1]	# Employees in GA [2]	Tons Film Plastic/Yr	Rank
Manufacturing - Paper/Allied	0.6	6.3%	18,560	540	21
Manufacturing - Transportation Equipment	0.4	5.1%	32,321	508	22
Manufacturing - Primary/Fabricated Metal	0.7	2.8%	28,896	436	23
Manufacturing - Industrial Machinery	0.2	6.5%	32,322	324	24
Utilities	0.3	3.9%	25,932	234	25
Forestry	0.2	2.2%	1,285	4	26
<b>TOTAL</b>				151,403	

[1] Based on data compiled by the California Integrated Waste Management Board during their 1999 Waste Characterization Study for disposed waste, except for restaurants, retail trade - food stores, durable goods wholesalers, hotels, and malls, which were based on a subsequent study in 2005 that separately characterized trash bags, retail bags, and other film (trash bags removed from data in this table).

[2] Based on County Business Patterns (2006), with the exception of Agriculture employment, which was obtained from the Dept. of Agriculture (2002).

[3] Malls are a collection of Retail Trade – Other and Retail Trade – General Merchandise stores in one location and not a separate “industry” *per se*.

Because film plastic is difficult to store and collect, especially unbaled, another important consideration when looking at potential recovery is the amount of film plastic likely to be generated at an individual establishment. To do this, we gathered Georgia-specific data about the number of businesses within each of the 25 business types that are estimated to dispose of the most film plastic in Georgia, and estimated the amount of film plastic the average establishment was likely to dispose. We then ranked the business types by the amount of film plastic estimated for the average establishment. In other words, for which business types would you be the most likely to garner the most film plastic for each pick-up? The results are shown in Table 2-3.

**Table 2-3  
Estimated Film Plastic Disposed by Individual Establishment in Georgia**

Industry	Est. Tons/Yr [1]	GA Establishments	Tons/ Establishment/ Yr	Rank
Malls <sup>2</sup>	4,734	54	87.67	1
Manufacturing - Food/Kindred	8,936	504	17.73	2
Services - Medical/Health (hosp. nursing homes)	8,034	1,595	5.04	3
Retail Trade - Food Store	17,536	4,989	3.51	4
Manufacturing - Paper/Allied	540	193	2.80	5
Manufacturing - Furniture/Fixtures	711	316	2.25	6
Retail Trade - Restaurants	33,611	15,859	2.12	7
Services - Business Services	34,762	20,494	1.70	8

## Section 2

Industry	Est. Tons/Yr [1]	GA Establishments	Tons/ Establishment/ Yr	Rank
Retail Trade - General Merchandise Stores	2,820	1,809	1.56	9
Retail Trade - Building Material and Garden	4,136	2,774	1.49	10
Transportation - Other	3,800	2,786	1.36	11
Services - Education	1,884	1,979	0.97	12
Trucking and Warehousing	4,685	5,349	0.88	13
Retail Trade - Automotive Dealers & Service Station	1,720	10,667	0.87	14
Wholesale Trade - Nondurable Goods	1,126	1,446	0.78	15
Retail Trade - Other	13,913	21,507	0.65	16
Manufacturing - Transportation Equipment	508	832	0.61	17
Manufacturing - Lumber and Wood Products	1,031	1,727	0.60	18
Manufacturing - Primary/Fabricated Metal	436	972	0.45	19
Manufacturing - Printing/Publishing	694	1,630	0.43	20
Wholesale Trade - Durable Goods	2,779	6,601	0.42	21
Manufacturing - Industrial Machinery	324	1,293	0.25	22
Utilities	234	1,364	0.17	23
Services - Hotels/Lodging	1,692	1,940	0.16	24
Forestry	4	203	0.02	25
Agriculture	753	49,311	0.02	26

[1] See Table 2-2.

[2] Malls are a collection of Retail Trade – Other and Retail Trade – General Merchandise stores in one location and not a separate “industry” *per se*.

These rankings are significantly different than those regarding which business types as a whole are estimated to dispose of the most film plastic, shown in Table 2-3. When considered by individual facility, malls, food/kindred manufacturing, medical and health services, food stores, and paper and allied manufacturers are estimated to have the most film plastic per establishment.

As a result of these findings, R.W. Beck and DCA agreed to focus a survey of generators on the largest establishments in Georgia within each of the top five businesses that are likely to generate the most film plastic *by location*. In addition, we considered some of the largest restaurants in the State both because the tons per establishment are high and because of the large number of restaurants in the State. Table 2-4 indicates the six business types considered in more depth, including a description of each business type and the largest establishments (by number of employees) identified within each of these categories.

These facilities are shown on Figure 2-1. This map indicates that about half of these potentially large generators of film plastic in the State of Georgia are located within a 75 mile radius of metro Atlanta with a couple of facilities in each of the other large cities in the State. The exception is the food and kindred product manufacturers, which tend to be located in more rural areas of the State.

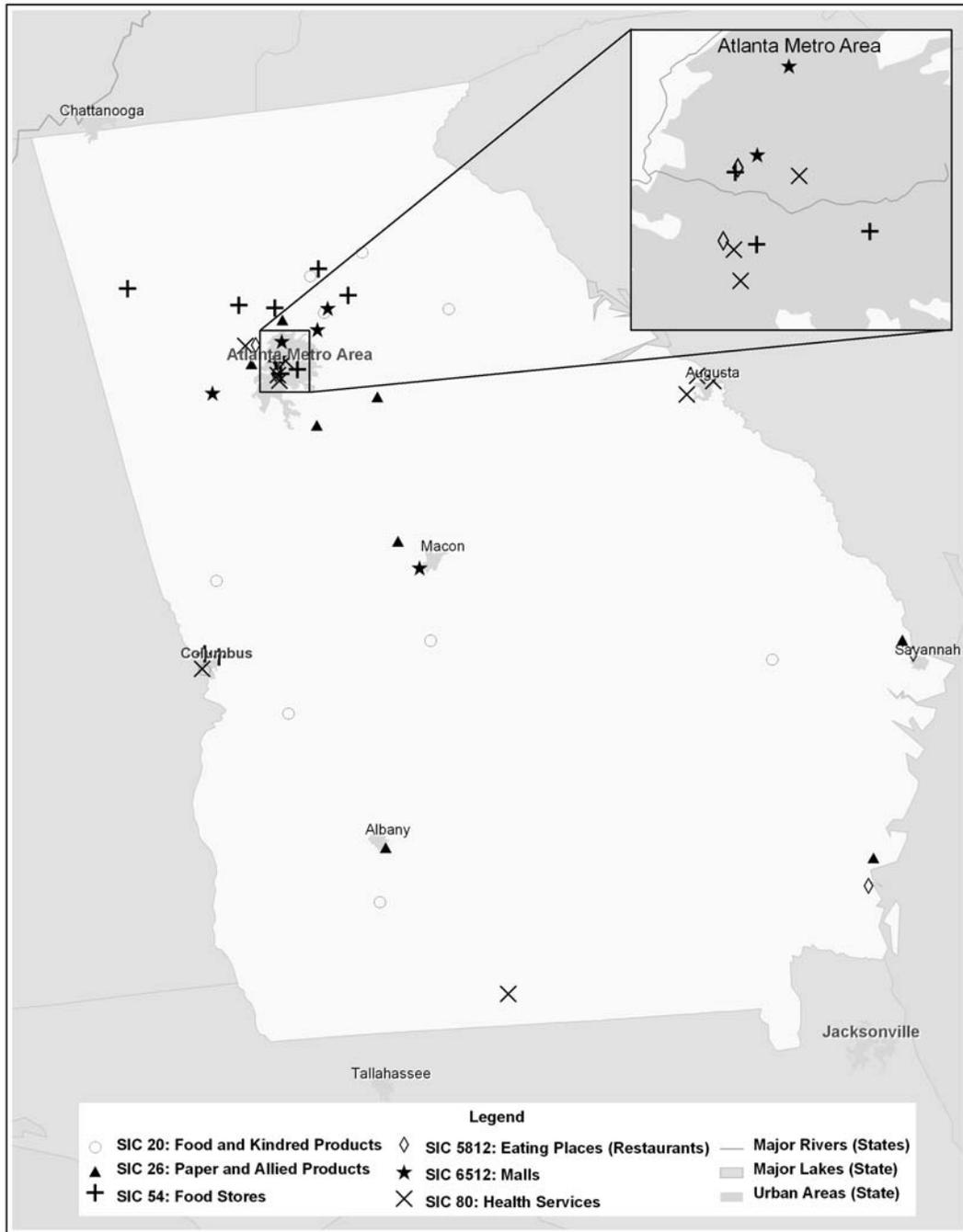


Figure 2-1 Potentially Large Generators of Film Plastic in Georgia



Section 2

**Table 2-4  
Identified Large Film Plastic Generators**

Business Type	SIC Code	NAICS Codes[1]	Description of Business Category	Locations Identified
Establishments Primarily Engaged in the Operation of Non-Residential Buildings (the largest of which area shopping centers)	6512	531120	Bank buildings, operation of; insurance buildings, operation of; lessors of piers, docks, and associated buildings and facilities; operators of commercial and industrial buildings; operators of nonresidential buildings; retail establishments, property operation only; shopping centers, property operation only; and theater buildings (ownership and operation).	Mall of Georgia; Gwinnett Place Mall; Lenox Square Mall; Perimeter Mall; Arbor Place; Macon Mall; Phipps Plaza <sup>2</sup> ; Individual stores at mall <sup>3</sup>
Manufacturing – Food / Kindred Products	20	311	Establishments manufacturing or processing foods and beverages for human consumption, and certain related products, such as manufactured ice, chewing gum, vegetable and animal fats and oils, and prepared feeds for animals and fowls.	Schwan's Bakery, Atlanta; Equity Group, Camilla (chicken processor); Cagle's, Pine Mountain Valley (chicken processor); Perdue Farms, Perry (chicken processor); Tom's Foods, Columbus (snack food manufacturer); Tyson, Cumming and Buena Vista, GA (chicken processor); Normal W. Fries, Inc., (chicken processor); Pilgrim's Pride, Murrayville and Gainesville (poultry processor and animal feed manufacturer)
Retail Trade – Food Stores	54	445	Retail stores primarily engaged in selling food for home preparation and consumption.	Dekalb Farmer's Market; Publix Markets (Woodruff Farm Road, Columbus; Bradley Park Drive, Columbus; Peachtree Road, Atlanta; and Rucker Road, Alpharetta); Whole Foods Market, Atlanta; Ingles Market, Cumming; Kroger Markets (Twin Lake Parkway, Woodstock; Hamilton Mill Road, Buford, and Rucker Road, Alpharetta)
Health Services – Hospitals and Nursing Homes	80 (part)	622, 623	Establishments primarily engaged in furnishing medical, surgical, and other health services to persons.	Grady Hospital, Atlanta; Medical College of Georgia, Augusta; Brooks County Hospital, Quitman; University Health Services, Augusta; Emory Crawford Long Hospital, Atlanta; Dwight David Eisen VA Hospital, Augusta; Egleston Children's Health Center, Atlanta; Cobb Hospital, Smyrna; Columbus Regional Medical Center, Columbus

## SOURCES OF FILM PLASTIC IN GEORGIA

Business Type	SIC Code	NAICS Codes[1]	Description of Business Category	Locations Identified
Paper and Allied Products	26	322	Establishments primarily engaged in the manufacture of pulps from wood and other cellulose fibers, and from rags; the manufacture of paper and paperboard; and the manufacture of paper and paperboard into converted products, such as paper coated off the paper machine, paper bags, paper boxes, and envelopes. Also included are establishments primarily engaged in manufacturing bags of plastics film and sheet.	Box Manufacturing, Stockbridge; Kimberly Clarke, Roswell (which closed, so we contacted the LaGrange mill, which manufactures a pulp fluff product for sanitary products); Proctor and Gamble, Albany (manufacturer of sanitary products); GP Cellulose, Brunswick (manufacturer of pulp fluff product); Weyerheuser, Wentworth (manufacturer of pulp fluff product); Tomahawk, Atlanta (paper mill); Graphic Packaging International, Macon (paperboard mill); National Envelope Company, Smyrna (envelope manufacturer) Paetiv, Covington (manufacturer of plastic bags)
Eating Places–Restaurants	5812	7221, 7222	Establishments primarily engaged in the retail sale of prepared food and drinks for on-premise or immediate consumption. Caterers and industrial and institutional food service establishments are also included in this industry.	ESPN Zone (Disney Entertainment) Atlanta; Savannah CWT Hotel, LLC, Savannah; The Cheesecake Factory, Atlanta; Dave and Buster's, Marietta; Sodexo, Inc., Atlanta (Georgia Tech Dining Services); Buccaneer Beach Resort, Jekyll Island

[1] Primary NAICS codes that align with the corresponding SIC code.

[2] Not one of largest malls in State but contact readily available.

[3] To gather more information than mall managers were able to provide and included Express, Belk, Gap, and Nordstrom's.

## Section 3

# GEORGIA'S FILM RECYCLING INFRASTRUCTURE

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The amount of film that is collected for recycling in Georgia and in the U.S. has not been consistently tracked. The American Chemistry Council reports that 830 million pounds (or 415,000 tons) of U.S. film was recovered in 2007. This Section looks at the collection, processing, reclamation, and end users available for film plastic in the State of Georgia.

It is important to note that state and local governments across the country have considered or instituted bans or taxes on certain types of film plastic, most notably plastic bags. Even at the federal level, such measures have been discussed. In April 2009, a bill was introduced in Congress to impose a nickel tax on single-use carryout bags that increase to 25 cents after 2015, with some exclusions. Should such legislation be passed, it is likely that infrastructure for collecting, processing, and end-use of plastic bags would rapidly evolve.

## Collection Programs

Because film plastic is lightweight (i.e. not many pounds per cubic yard), it can be inefficient to collect it loose. Thus, the most cost-effective collection programs are those that either collect material baled or can garner a significant amount of material from few locations to increase efficiency of collection. For this reason, most film plastic recovery programs in Georgia focus on commercial and industrial sources rather than residential sources. The exception is where film plastic is collected from residents at a central location, such as a grocery store or, less commonly, at municipal drop-off recycling sites.

Although the majority of residential recycling programs in the State do not accept film plastic, our research has identified several that do. The City of Douglasville accepts all plastic, including film plastic, in their curbside recycling program and delivers it to a private recycler. The Rome-Floyd County Recycling Center (see insert), the Roswell Recycling Center, and the Athens-Clarke County “Bags for Bears” drop-off

### Rome-Floyd County Drop-Off Program

Rome-Floyd County accepts grocery bags, bubble wrap, and dry cleaning bags at its Recycling Center where it is baled in a vertical baler on site and loaded onto a vehicle provided by TREX, the end user. Shrink-wrap, black film, and film that is wet or contaminated by food is not accepted. Film plastic is only accepted at the Recycling Center and not in the City's curbside program or at any of the other drop-off locations.

About one truckload per year is sent to market weighing 20 to 22 tons. The end user pays shipping costs and in late 2007, paid 18 cents per pound for the material. The result was annual revenue of \$7,560 in 2007 although prices declined in late 2008.

collection program also accept residential film (retail bags, dry cleaner film, and newspaper sleeves), which is baled at their recycling processing facilities and sent to market. Forsyth County began collecting plastic bags at its three drop-off centers at the beginning of 2009 and sends them to a local processor.

Perhaps more residents in the State deliver their plastic bags, and sometimes other film plastic, to retail chains that provide containers for depositing these materials. According to [plasticbagrecycling.org](http://plasticbagrecycling.org), the following retail establishments collect film for recycling from Georgia residents, although it is likely there are other similar locations in the State:

- Armstrong Atlantic State University Bookstore;
- Bi-Lo;
- Food Lion;
- Harris Teeter;
- Ingles Market;
- Kroger;
- Publix;
- Wal-Mart; and
- Winn-Dixie.

The above retail establishments have hundreds of stores in Georgia. However, it is unknown how many of these locations have collection containers for film plastic.

Businesses in Georgia are believed to recover large quantities of their own post-use film for recycling. Businesses that recover film plastics include Shaw Industries, Coca-Cola Enterprises,<sup>5</sup> Wal-Mart, and many others. There are no data on the amount of commercial film that is diverted from disposal in Georgia.

## Processing Infrastructure

According to the U.S. Census, there are 177 dealers/wholesalers of recovered materials in Georgia.<sup>6</sup> The majority of these facilities handle scrap metal specifically; however, an increasing number were recovering film plastic as well, as least until mid-2008 when markets began to drop. Table 3-1 lists the companies that take low-density polyethylene (LDPE - which is usually film plastic) from Georgia according to the Georgia Recycling Markets Directory as of May 1, 2009. Although film plastic may be resins other than LDPE, there is currently no way to select for “film plastic” or other resins on the online Georgia Recycling Directory.

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<sup>5</sup> Coca-Cola Enterprise's two Atlanta-area Production Centers in College Park and Marietta are recovering and recycling their internally generated low-density polyethylene film. This recycling program is part of CCE's long-term goal of keeping all of its production-related and consumer packaging materials out of landfills. When fully implemented, the Atlanta-area program is expected to divert approximately 250 tons per year of LDPE from disposal.

<sup>6</sup> County Business Patterns for NAICS 42393 Recyclable Material Wholesalers.

**Table 3-1  
Private Companies Handling Recovered LDPE in Georgia<sup>1</sup>**

Company Name	County
ABC Polymers, Inc.	DeKalb
Able Plastics	Cobb
All American Recycling	Muscogee
AmeriSouth Recycling & Consulting Inc.	Fulton
Antek Madison Plastics Recycling Corp.	Cobb
Blough Tech, Inc.	Grady
Conex of Georgia	Carroll
Cycle-Tex	Whitfield
FortiFiber Corporation	Lowndes
Generated Materials Recovery LLC	Out of State
Georgia-Pacific Corp.	Fulton
MC Plastics Recyclers	Barrow
Polymer Marketing, Inc.	Cobb
Polymer Sciences Inc.	Fulton
Pratt Industries Recycling Division	Fulton
Recover, Inc.	Greenville
Recycled Materials Inc.	Fulton
Rondy & Company	Out of State
SBC Recycling	Cobb
Smurfit Recycling	Richmond
SP Recycling Corp. Gwinnett	Gwinnett , Cobb, Clayton
Sundance	Hall
Suntex Plastics Corporation	Camden
Turn Machines Green	Barrow
United Plastic Recycling, Inc.	Fulton

[1] Georgia Recycling Markets Directory.  
<http://www.dca.state.ga.us/development/EnvironmentalManagement/programs/recycling/default.asp>

With the exception of the publicly owned facilities, most of these processors are recovering film from the commercial sector, either accepting sorted material directly or accepted recyclable-rich loads and pulling out cardboard, film plastic, and other recyclables. For example, as of late 2008, Smurfit Recycling was planning to open a MRF inside of a solid waste transfer station operated by Advanced Disposal in

College Park to sort loads of commercial solid waste that are rich in recyclables. Although their primary intention is to recover fiber materials such as old corrugated containers, Smurfit also plans to recover film plastics from this waste stream. R. W. Beck estimates that 400 to 600 tons per year of film may be able to be recovered by Smurfit at the College Park location. The processors listed above focus on serving commercial establishments that do not recover and bale their own old corrugated containers (OCC) and any similar processor of paper could consider adding film to the list of materials that are recycled. However, fiber processors are less likely to make this effort until markets for both fiber and film plastic rebound.

A number of facilities that generate large quantities of OCC, particularly those that are part of companies with centralized warehouse and distribution centers, may also be recycling film plastics. These businesses will often bale their own OCC. In some cases, they may bale film plastics as well, or they may stuff film plastics into larger bags to be baled after back-haul to a central distribution center. Examples of companies that may bale their own film, either in individual store locations or at a central distribution center include grocery stores, furniture stores, and large retailers. For example, large bags of film are back-hauled by Publix stores in Georgia to a central distribution center where they are baled. Wal-Mart, who reportedly recycled 2,243 tons of material in Georgia in 2008<sup>7</sup>, has pioneered an in-store processing approach where a central layer of film is baled between layers of OCC, called a “sandwich bale,” for separation further downstream and delivery to end users. Wal-Mart is expanding to include other materials in these bales, called “super-sandwich bales,” which may include aluminum cans, plastic bottles, and other recyclable materials.

## Reclamation Infrastructure

Demand for recovered polyethylene film varies significantly based on its quality and film is often classified by reclaimers based on the source as described below. However, it is important to note that there is no standard market grade for film plastics and each reclaimer must be contacted for its own specifications.

- **Commercial film.** Commercial film is the highest quality of film with the greatest market demand and highest pricing. Commercial film is normally clear with little-to-no colorants or printing and is typically composed of products such as stretch wrap and bags that protect products being shipped.
- **Return-to-retail film.** The next best quality of film is bags that have been returned to retailers for recycling. This type of film also includes products such as dry cleaner bags, newspaper sleeves, and other clean residential films that are labeled as HDPE or LDPE. Retailers may also combine the commercial film they generate with the residential film that is returned. Because mixed residential films have colorants and printing, their value and flexibility for end uses is less than commercial film.
- **Curbside film.** Some municipalities collect film in their curbside recycling programs. The film recycling industry generally does not encourage collecting

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<sup>7</sup> Report to Georgia Department of Community Affairs, 2008.

film in that manner because the film tends to pick up contaminants and is of lower quality than residential films that are returned to retail. In addition, film plastic typically not acceptable in single-stream loads, the type of loads that are commonly collected in curbside programs in Georgia.

- **Agricultural film.** The lowest quality of film is film that has been used for agricultural uses and may include mulch film, irrigation drip tubing, silage bags, and greenhouse and nursery film. Certain types of agricultural film may be pigmented black or white, which limits its recycled uses, and often needs to be washed because of contamination. Certain greenhouse film, if it is kept clean by avoiding contact with the ground, however, can experience higher prices and market demand.

Table 3-2 lists companies that were recycling film plastic back to a form ready for reuse (“reclaimers”) as of early 2009 that are located both inside and outside of Georgia. The companies differ in terms of the sources from which they accept film as shown in the Table.

Table 3-2  
Film Reclaimers Serving Georgia

Company	Location	Commercial	Return-to-Retail	Curbside	Agricultural
Nemo Plastics	Atlanta, GA	✓			
Cycle Tex	Dalton, GA; Rome GA	✓			
Jerico Plastic Industries	Greensboro, GA	✓			
Sundance Products Group	Gainesville, GA	✓			
Webster Industries	Montgomery, AL	✓	✓		
ITW Angleboard	Darlington, SC	✓			
Trex	Winchester, VA	✓	✓		✓
Mountain Valley Recycling	Morristown, TN	✓	✓		✓
Hilex Poly	Mt. Vernon, IN	✓	✓	✓	✓
RKO Industries	LaBelle, FL				✓
AERT	Lowell, AR	✓	✓	✓	✓

Table 3-3 is not a comprehensive list of film reclaimers; however, it is believed to represent the primary reclaimers that are available for Georgia film. A summary of each company on the list follows:

- Nemo Plastics – recycles clean commercial film plastics and sells the recycled resins;
- Cycle Tex – specializes in reclaiming materials that are generated by companies in the textile industry;
- Jerico Plastic Industries – produces molding compounds, especially for rotational molding;
- Sundance Products Group – produces recycled resins for merchant sale;

- 
- Webster Industries – recycles film into trash bags for residential and commercial use;
- ITW Angleboard – recycles film and poly-coated paper into angle board materials to protect the corners of products being shipped on pallets;
- TREX – manufactures composite decking materials from recycled film and sawdust, will only accept agricultural film if clean and clear;
- Mountain Valley Recycling – specializes in working with retail chains to recycle their film plastics, hangers, and other discards they generate and will only take clean agricultural film;
- Hilex Poly – retail carryout sack manufacturer that does closed-loop recycling, manufactures agricultural film, and operates a wash line for film and will only take clean agricultural film;
- RKO Industries – recycles agricultural films, including mulch films, into plastic railroad ties; and
- AERT – large reclaimer of film plastics that produces composite decking materials.

## End Use

Nationally, the vast majority of recycled film goes to composite lumber producers such as Trex and AERT. A large percentage, particularly off the West Coast of the United States was exported for recycling as of mid-2008 although that amount has likely dropped as a result of the economic downturn. Figure 3-1 illustrates the end use of film that was recycled in 2006.

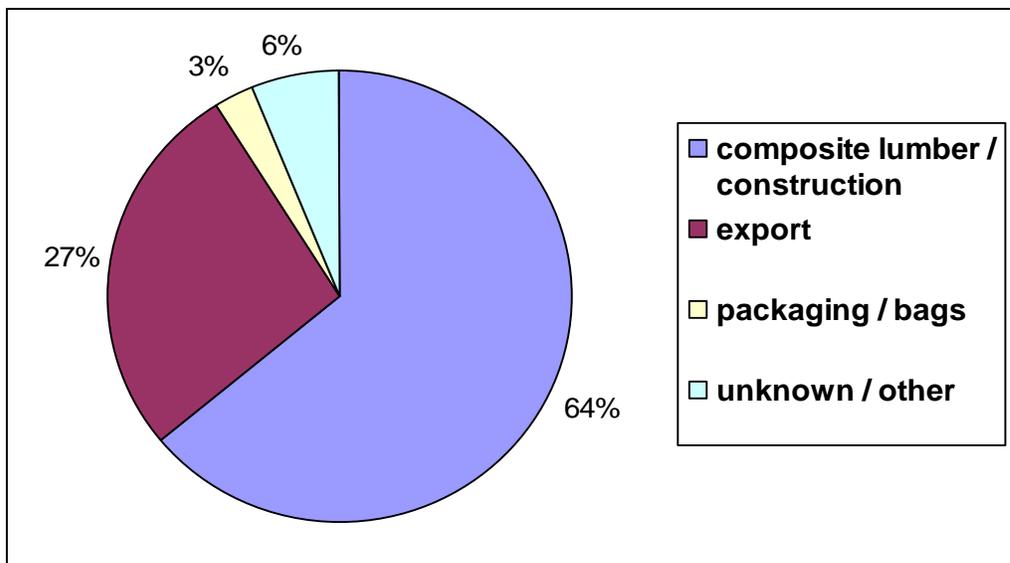


Figure 3-1: End Use of Film Collected for Recycling

Source: American Chemistry Council – Plastics Division “2006 National Post-Consumer Recycled Plastic Bag and Film Report

Historically, market demand for film plastics has been strong and growing, driven by the extraordinary growth rate of the composite lumber industry. Although demand in 2008 slowed due to the contraction of the United States economy, long term demand is expected to be strong. As of mid-2008, because demand had outstripped supply, Trex was importing film from Europe to meet its demand and AERT announced that it would construct a wash facility that could be used to reclaim agricultural film, curbside film, and HDPE bottles because growth in film supply has not met its needs. In April 2009, a plastic bag manufacturer’s group, the Progressive Bag Affiliates of the American Chemistry Council, announced a goal of 40 percent recycled content in all plastic bags by 2015, including at least 25 percent post consumer recycled plastic. If achieved, this should also contribute to a long-term increase in the demand for film plastic in the United States.

## Pricing

Pricing for film plastic generally follows the pricing for virgin extrusion grades of polyethylene and recycled pigmented HDPE bottles. In September 2008, commercial film from Georgia could be sold for approximately twenty-seven cents per pound, retail film was selling for approximately 18 cents per pound, curbside film was selling for about five cents per pound, and agricultural film was selling for zero to two cents per pound. By February 2009, during the lowest markets for recyclable commodities seen in years, the price for all categories of film plastic fell to zero or below except for commercial film, which had a posted value of 7 to 8 cents per pound as shown in Table 3-3.

Table 3-3  
Estimated Value of Film Plastic by Type/Source

Type	Market Value (cents per pound)	
	Sept. 2008	February 2009
Agricultural LDPE	2	0
Commercial polyethylenes (excluding trash, ag)[1]	27.5	7-8[3]
Resident polyethylenes (excluding trash, ag)[2]	18	0
Other resins	0	0

[1] Waste News, Secondary Materials Online, LLDPE stretch film FOB Atlanta, Sept. 2008.

[2] Assume mixed films, returned-to-retail, that trade at approximately a 9 cent/lb. discount to commercial film.

[3] Waste and Recycling, Secondary Materials Online, LLDPE stretch film FOB Atlanta, Feb 16, 2009. Price at 9-10 cents as of July 10, 2009.



## Section 4

# FILM PLASTIC RECYCLING CHALLENGES AND OPPORTUNITIES

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R. W. Beck surveyed some of the largest potential generators of film plastic in the State as identified in Section 2 of this report. A telephone survey was conducted to determine how much film plastic a particular location generated, the type of film plastic generated, and current management practices. Respondents were also queried about the issues associated with recycling more film plastic. A copy of the survey form is included as Appendix A.

Although the survey was initially intended to include the results from up to twenty of these individual businesses, knowledgeable contacts at many of these businesses were difficult to reach. Thus, a total of 35 businesses were contacted and information was gotten from 24 of them. Many of these generators did not have specific information about the characteristics or quantity of the film plastic they generated; more were aware of the sources of the film, how it is managed, and what recovery strategies may be feasible. This information was used to identify the following challenges and opportunities associated with recovering film plastic in Georgia.

- Because film plastic is lightweight, it can be costly and difficult to store, handle, and ship prior to baling. Thus, if a generator does not have sufficient quantity, space, or other resources to bale the material on site, handling film plastic can be a challenge.
- Also because of its lightweight, generators may not perceive that diverting film plastics will result in significant waste disposal cost reductions (which are typically paid by the ton).
- Contamination by labels, adhesives, tapes, printing, and foam packing materials can reduce the marketability of this material. Because of its lightweight, the weight of contaminants can be high relative to the weight of the film itself.
- In order for film to go to the highest recycled product use and be of the highest value it needs to be separated by resin type (LDPE/LLDPE, HDPE, PP, and other resin types separate from each other). Because film plastic is not required to be labeled by resin type like plastic containers (and often is not), it can be difficult to identify resin type and thus, for many generators, it may be difficult to access the highest value markets.
- Sorting films is typically done by hand due to the variation in film size, weight, shape, and agglomeration with other films that limits the use of mechanical sorting. This can be labor intensive and so generators and processors must separate and distinguish film plastic types before it is baled and shipped to a reclaimer.

- As with many commodities, recent declines in commodity prices have made recovery of film plastics less lucrative. For example, one of the food manufacturers surveyed reported that they had begun to look into recovering film plastic from their operations but sudden price dips resulted in less interest on the part of the processor.

## Residential Film Plastic Challenges and Opportunities

Curbside recycling of residential film plastic has been implemented in several communities throughout the United States and Canada, often included in the fiber bin in two-stream manual sort system such as in several programs in Ontario. However, in the State of Georgia, the collection and processing infrastructure is moving toward single-stream, which is not amenable to inclusion of film plastic. Processors and end users report that film plastic can be contaminated by the contents of plastic and other containers when collected together. In addition, they report that film plastic can get caught in typical processing equipment used in single-stream facilities. Trex, an end user who historically accepted film plastic from curbside programs, stopped accepting this material because it was cost prohibitive to wash the material before processing. In addition, residents tend to have difficulty differentiating between recyclable and non-recyclable film, especially if the film plastic accepted in the program goes beyond retail bags, dry cleaner bags, and newspaper sleeves to include recyclables items such as frozen vegetable bags.

On the other hand, many more residents are effectively served through take back programs for film plastics. These programs tend to be convenient because collection locations are often at retail outlets, such as grocery stores, where residents are going anyway. In many cases, these programs are limited to plastic bags but some do take other types of recyclable film plastic. Even in these conveniently located programs, participation is likely to be lower than in a curbside program; however, material is likely to be cleaner.

## Commercial and Industrial Film Plastic Challenges and Opportunities

As described Section 2, an estimated 74 percent of the film plastic disposed in the State that is not trash bags, is assumed to come from commercial and industrial sources. The film plastic from these sources is likely to be cleaner and more concentrated at businesses than at residences; this is important with such a lightweight material that is difficult to handle when loose. Some generators, such as retail stores, generate fairly significant quantities of uncontaminated film plastic at one time (e.g., when a shipment arrives and merchandise is set out in the store). This presents an opportunity to recycle clean material on a periodic basis, which may be more efficient than having to clean material and ship or bale material on a continual basis. In addition, some locations, such as large retail stores, have the ability to bale their recyclables on site, and in many instances can include different types of materials in one bale. Wal-Mart is able to do this, as is Schwann's Bakery (who recycles through

Ultimate Solutions). This allows the generator to densify materials on site, reducing storage and shipping concerns associated with loose film plastic. Other retailers that generate large quantities of cardboard, such as auto dealerships, home improvement stores (Lowes, Home Depot, etc.) and convenience stores may be able to include film plastic in their OCC recycling program, possibly even in the same bales. These businesses that may not generate enough film plastic or have other limitations that prevent them from sorting and baling film plastic on-site could send loads that primarily contain clean and dry fiber and film plastic to existing facilities that are recovering recyclables from commercial recyclables. Although this activity may have slowed when the market price for recyclables declined, transfer stations and other facilities were adding the capability to pull out recyclables from commercial loads and will likely do so again as the markets improve.

The remainder of this Section describes the challenges and opportunities identified based on survey with businesses within each of the six business types identified as significant sources of film plastic in the State of Georgia, based on the estimated amount of film plastic generated by the average establishment within that business type.

## Shopping Malls/Centers

Section 2 estimates that 4,734 tons of film plastic is disposed from malls and shopping centers in the State of Georgia, with an average of 87.7 tons per mall/shopping center. Although the malls we surveyed did not know how much film plastic was disposed from their location, given the variation in mall/shopping center size, it is likely that significantly more than the average of 87.7 tons is likely to be disposed from the largest malls in the State.

In our generator surveys and other research, the following challenges to recycling film plastic were identified for malls and shopping centers.

- Many malls are operated by a management company who provides collection and disposal of waste by its tenants. However, mall representatives contacted were unaware of the types of waste streams being generated at each store. Obtaining accurate data regarding types and quantities of waste streams generated often means contacting individual stores directly.
- Malls managed by a management company have the same program nationwide. They may be unwilling or unable to change their operating procedures locally unless the entire corporation does so. A representative of Simon Malls, for example, indicates that Simon is currently focused on recovery of cardboard and fluorescent bulbs rather than film plastic.
- In many malls, anchor stores make their own arrangements for waste disposal and recovery, which can mean additional points of contact and containers required for film plastic recovery programs.
- Many retail stores face high staff turnover, which could complicate training issues with film plastic recovery programs.

- Except for only the largest stores, film plastic may not appear to be generated in large quantities. Thus, the challenge would be to either target the large stores exclusively or to aggregate the film plastic from the smaller stores in a central location.
- Film plastic may be generated throughout the stores, not just in a back room, which may make recovery more difficult.

The following opportunities were identified for recycling film plastic at malls and shopping centers.

- The centralized nature of management of many of the largest malls presents an opportunity as well as a challenge. If a national or regional mall management company can be convinced to recover film plastics, they may do so regionally or nationwide. It appears that malls are largely comprised of similar stores nationally, which have similar shipping and receiving practices.
- Some anchor stores, such as Nordstrom's, have reportedly made a commitment to adopt sustainable practices, which could result in a willingness to separate and recover film plastics. Smaller stores in the same malls could possibly piggyback on the recycling program of the anchor store, especially if benefits could be realized by the anchor store.
- Several individual stores (Belk, Express, and Gap) at malls indicated that they generate a significant amount of clean film plastic, as many of their inventory, for example, clothing items arrive individually wrapped in plastic to protect the item. This plastic is free of contaminants, and could be separated from other waste streams fairly easily. The amount of the material generated would vary throughout the year, based on fluctuations in sales. Many such stores are located in malls or strip centers next to other like stores. Recyclers may be willing to establish collection programs where OCC and film can be collected together.

## Food Manufacturing

Section 2 indicates that an estimated 8,936 tons of film plastic is disposed annually by food/kindred manufacturers in Georgia, or an average of 17.7 tons per location. In our generator surveys and other research, the following challenges to recycling film plastic from food manufacturers were identified.

- The estimated tonnage is based on an estimate of film plastic generated by food/kindred manufacturers in California. Because California's food manufacturers may be different than Georgia's (more produce, less chicken, for example), California's tonnages may not be applicable to Georgia's in this business category. Several food/kindred manufacturers surveyed indicated that they do not generate any or much film plastic (such as Cagle's in Pine Mountain Valley), while others report that there is a fair amount generated on site that could potentially be recovered. Schwan's Bakery, for example, indicated that they have looked at the potential of recovering film plastic, and determined that they do not generate enough to make such a program worthwhile, in their estimation.

- Film plastic generated by food manufacturers may be contaminated with food residue. For example, Perdue and other chicken processors indicate that they receive chicken parts in boxes lined with film plastic. This film is contaminated, and likely unsuitable for most film plastic recovery programs.

The following opportunities were identified for recycling film plastic by food manufacturers.

- Some food manufacturing plants, such as Perdue, use mechanized process to wrap their products. When there is insufficient film plastic remaining on a roll to wrap an entire “run”, then the roll is removed and the material is discarded. This presents an opportunity to divert clean film plastic at the manufacturing facility.
- Food manufacturing facilities normally have existing recycling programs for OCC, and film recycling may be easier to implement in conjunction with existing recovery programs.
- Other materials may be able to be recycled as well as part of a comprehensive program, including barrels, shipping crates, Gaylord boxes, pallets, woven sacks, etc.
- Space may be less of a constraint at manufacturing plants than it is at retail locations.

### Food Stores

In Section 2, it is estimated that food stores in Georgia dispose of 17,536 tons of film plastic per year. However, because there are nearly 5,000 food stores in the State, this amounts to an average of 3.5 tons per establishment. The larger food stores that we surveyed, are likely to generate more than this average. Our surveys and other research into recycling film plastic from food stores suggest the following challenges:

- Most stores are unaware of the quantity of film plastic they generate and/or recover, however the Mill Gen Publix (Columbus) estimated that they generate 8 to 12 40-gallon bags per day, and the Town Lake Kroger in Woodstock estimates they fill four or five 4-foot tall plastic bags on a weekly basis.
- Space is a constraint in retail facilities of all types, especially for material that must be stored inside.
- Film plastic that has been in direct contact with food, such as that in the deli/prepared foods area, may be considered contaminated by processors and thus unsuitable for film plastic recovery programs. Care must be taken to avoid cross-contamination from meat/dairy films with polyethylene films.
- Small food stores, especially those that are not chains, may lack the resources for recycling.

The following opportunities for recycling film plastic were identified.

- Every food store contacted for this study (primarily the larger chains where larger amounts of film plastic were anticipated), including Whole Foods Market, Ingles,

Publix and Kroger, indicate that they are already involved in film plastic recovery programs, and that sustainability is important to their company.

- Residential return of retail film can be (and often is) combined with the store's own film to reduce storage requirements and increase total amounts. However, some stores report that because this lowers the value of the store's own film plastic, some keep the residentially generated material separate.
- Many retail stores have the ability to bale materials on site, or transport recyclables to distribution center or warehouse for baling and/or delivery to market via backhauls.

### Hospitals/Health Facilities

An estimated 8,034 tons of film plastic is disposed from hospitals and other health facilities annually, an average of 5.0 tons per facility. The following challenges were identified for recycling film plastic from these facilities.

- Many hospitals and medical facilities span several buildings, so it can be challenging to obtain information and implement programs consistently among all facilities or departments. It appears that one person is not necessarily aware of or responsible for all material generated in the hospital. If a program is to be set up, it would likely require the coordination and cooperation of several departments, including material receiving, facilities, environmental services, operating room staff, dining services (which is often a separate outsourced service); and other departments.

A representative of one of the larger hospitals indicated that he does not believe it is worthwhile to recover all of the film plastic that is generated in so many different departments throughout the hospital – the material is too dispersed and it would take too much effort.

- Like malls, some hospitals are managed by a management company that has the same program nationwide. They may be unwilling to change their “routine” unless the entire corporation does so.
- A couple of hospitals surveyed expressed a concern that some film plastics may be contaminated and thus pose a risk if recycling. For example, latex gloves and any materials contaminated by blood or bodily fluids are not suitable for recovery. A representative of another facility indicated that he is uncertain whether recovery of film plastics could potentially spread pathogens/illness. Even if recycling of some film plastic at hospital is feasible, management, employees, and patients would have to be educated on what is recyclable and what is not and educated in a way that alleviates concern regarding contamination.
- Sterilization film (blue film) is made from polypropylene and must be separated from polyethylene films for maximum value.
- A representative of the Grady Health System, one of the largest medical facilities in Georgia, indicated that the hospital is struggling financially, and while the CEO supports recycling efforts that can be done easily, it is not a priority at the moment,

particularly given low commodity prices. Higher commodity prices may make programs more attractive.

- A representative of one of the hospitals indicated that new “life safety standards” might hinder recovery programs. For example, all containers for laundry, garbage, recycling, etc., that are over 32 gallons, must be placed in a locked area with smoke detectors and sprinklers rather than in hallways or work areas. This could make them difficult to access.

The following opportunities were identified for reducing and recycling film plastic disposed from medical and health facilities.

- It appears that there is the opportunity to recover large quantities of film from single generating locations.
- Cycle Tex in Georgia specializes in recycling polypropylene and may be a close market for blue film.
- Hospitals normally have existing recycling programs for OCC, which may make it easier to implement film plastic recycling.
- There may be opportunities to work with medical supply companies, such as Cardinal, to reduce the generation of film plastics. The representative of Grady Health Systems indicates that they have already made some effort to do this, such as providing supplies in reusable rigid totes, rather than shrink-wrapped on pallets. An “on-demand” inventory system helps facilitate this, as smaller quantities of each material are delivered, as indicated are needed through the inventory system.

### Paper/Allied Manufacturers

An estimated 540 tons per year of film plastic is estimated to be disposed by paper/allied manufacturers. With 193 listed facilities in the State, the average amount per facility was estimated to be 2.8 tons per year, the fifth highest average per-location tonnages by business type. The following challenges were identified regarding recycling film plastic from these facilities.

- It may be difficult to identify large-scale generators. Three manufacturers interviewed (Kimberly-Clarke-LaGrange, GP Cellulose, and Weyerhaeuser-Port Wentworth) indicated that they only generate a small volume of film plastic, from shrink-wrapped feedstocks. Two of the three manufacturers interviewed indicated that they generate so little of the material that it is not worth recovering.
- Several manufactures indicated that the material they manufacture (fluff pulp which is used to manufacture diapers and sanitary products) is wrapped in plastic to protect it from moisture during shipping. Therefore, significant amounts of film plastic would be generated at the final destination – which is generally Asia or Europe, according to the manufacturers.

On the other hand, the following opportunities were identified for recycling film plastic from these facilities.

- Manufacturers may be able to recover film plastics mixed with other plastics or other commodities generated on site. For example, Kimberly-Clarke indicates that they currently bale film plastic with their rigid plastics on site, and recycle the mixed bales (as well as OCC) through Regional Recyclers.
- Space may be less of a constraint at manufacturing plants as it is at retail locations.

## Restaurants

Based on the California study, it is assumed that restaurants in Georgia dispose of 33,611 tons of film plastic per year, second only to “business services” in total tonnage per business type with fewer locations (and thus more film plastic per location) than the business services category. This results in an estimated average of 2.1 tons per restaurant. Restaurants we surveyed indicated the following challenges with recycling this material at their locations.

- Much of the plastic generated on site is food-contaminated film (for example, the ESPN Zone indicates that most of their meat and seafood arrives in single-serve cryogenic plastic) and is therefore typically not desired by markets or local recycling service providers.
- Some restaurants, like Hard Rock Café, indicate that they generate little or no film plastic on site.
- High employee turnover in restaurants makes implementing and maintaining a film plastic recovery program challenging, from a training perspective.
- In many cases, there are space constraints in restaurants so storing film plastics may be a challenge.
- Some restaurants are owned by national or regional companies, therefore they carry out the waste management program set up by their headquarters. This can pose a challenge as well as an opportunity (as described below).

The following opportunities were also identified.

- Large-scale restaurants also generate film plastics that would not be contaminated, such as bags in which pasta is delivered, and shrink-wrapped cans and beverages. Some large restaurants may also receive pallets of shrink-wrapped items (for example, The Cheesecake Factory receives pallets of cheesecakes that are shrink-wrapped).
- Many restaurants are already served by OCC recycling programs and clean dry film could be included in the OCC stream if a recycler is identified that will take the mixed material.
- Some restaurants may be owned by larger companies that have an interest in adopting sustainable behaviors (such as ESPN Zone in Atlanta, which is owned by Disney Entertainment), which may make them more willing to participate in a film plastic recovery program.
- It may be possible to work with large-scale restaurant suppliers, like Sysco and Monarch Foods, to identify restaurants that receive large quantities of film plastic.

They may also be willing to participate in backhauling film plastic to a designated processor.

- One restaurant, Hard Rock Café (Atlanta), indicates that they receive deliveries from a rented truck and that the shrink wrap stays on the truck, which provides an opportunity for it to be recycled if it is not. Other restaurants could require this of vendors.
- Some large-scale generators of film plastic, such as Sodexo, Inc., which operates food services at Georgia Tech, may be able to work with students (perhaps through the Recyclemania program) to increase recycling.



## Section 5

# STRATEGIES FOR INCREASING RECOVERY

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This Section identifies potential strategies to be carried out by State and local governments, business and industry, and others to increase diversion of film plastic from disposal in Georgia. Based on the assessment of sources of film plastic, the existing infrastructure for collection, processing, reclamation, and end use, and the challenges and opportunities associated with recovering film plastic from individual sources, it appears that more “bang for the buck” will be gained through programs aimed at the commercial and industrial sector than by collecting film plastic from residents at curbside and typical drop-off centers. For most communities, especially those with single-stream systems, collection of residential film plastic at centralized locations, such as retail outlets, may be the best option for residentially generated material.

This study indicates that the commercial and industrial sectors are likely to be the most feasible and cost effective sources of film plastic. It also identifies the business types and individual locations where significant amounts of film plastic are likely to be generated. However, before investing resources to implement these strategies, it would be worthwhile to conduct generator based composition studies to ensure that composition of waste from an individual business is consistent with expectations, and a good target for a film plastic diversion program, and then to implement these strategies in a way that targets them.

## Setting Goals and Measuring Progress

One of the first steps to implementing a comprehensive film plastic recovery strategy is to set a goal and determine how progress toward the goal will be measured. As a result of the findings of the Statewide Waste Characterization Study, the Georgia Department of Community Affairs worked with recyclers and other stakeholders to establish recycling goals for paper, plastic, glass, and metal, shown in Table 5-1. The projected recycling goal for plastic is 16 percent by 2012 and 20 percent by 2017, with an anticipated focus on PET and HDPE containers primarily. The State should work with generators, collectors, processors, reclaimers, and end users of plastic to reevaluate the statewide recycling goal for plastic to determine whether any adjustments should be made to account for diversion of film plastic based on the findings in this report. To measure progress toward goals and determine the impact of programs implemented or expanded, questions addressing film plastic recycling should be specifically included in RETRAC, the State’s online reporting system for reporting recycling activity and results. Finally, the State should update the waste characterization study that identified the composition of waste being disposed to determine the progress toward all recycling goals on a statewide basis.

Table 5-1  
State of Georgia Commodity Recycling Goals

Commodity	Projected Goals	
	2012	2017
Glass	8%	8%
Paper	15%	28%
Metal	13%	18%
Plastic	16%	20%
<b>TOTAL</b>	<b>11%</b>	<b>23%</b>

## Education and Information Programs

- **Incorporate recycling of film plastic into statewide recycling information.**

Generators may be unaware of the benefits and infrastructure for film plastic recovery. In an effort to educate generators, the State should incorporate information about film plastic recycling into its education programs about recycling, including its Sustainable Office Toolkit, Recycling Coordinator training materials, and other educational and training materials. The State could also work with local governments and organizations to offer recognition through publicity, awards, and other benefits to emphasize the efforts of individual businesses.

- **Target high generators for training about evaluating and implementing the potential to divert film plastic.**

The State and local governments can work through existing organizations and business associations to help businesses include film plastic in their waste audits and collection and processing programs. Target businesses can be educated on their options through case studies and information about how to address issues of special concern to their business type such as contamination and space constraints.

- **Ensure that generators have access to information about film plastic recycling options.**

Make sure that Earth's 911, the Georgia Recycling Markets Directory, and other resources used by generators in Georgia, provide updated information about collection locations and processors for film plastic in a way that users can understand. For example, the Georgia Recycling Markets Directory could list processors and end users for "film plastic" or "plastic bags" as a search term rather than "LDPE", a term some generators may not think to search.

- **Sponsor focused pilot programs by business type.**

For business types identified as generating large quantities of film plastic, find one or two with a "sustainability" focus to serve as a pilot for a film plastic recycling program. Enlist that business in promoting the success and challenges of their program through industry associations. Development or Expansion of Collection and/or Processing Infrastructure

## Collection and Processing Infrastructure

- **Work with recycling hubs to determine the best way to collect and process film plastic in a way that maximizes recovery but does not interfere with the single-stream processing equipment or the quality of other materials.**

Our research suggests that processors typically prefer not to handle film plastic in a single-stream facility or in the container stream of a dual stream system. Since the State is working with operators of several single-stream recycling hubs around the State, facility operators should be consulted regarding approaches to divert film plastic outside of the single-stream system. Best management practices identified at the regional hubs could be used as a pilot for other facilities around the state.

- **Conduct generator based characterization studies or audits to identify large generators.**

This report identifies the potentially large generators in the State based on composition data from other areas of the country. To ensure that composition of individual businesses is consistent with expectations and the appropriate businesses are being targeted, state or local government can work with individual businesses to conduct a waste audit to confirm a business is a good target for a film plastic diversion program.

- **Work with larger generators to build infrastructure to divert film plastic.**

Once it is confirmed that an individual business or business type is a good target, the State and local governments can assist businesses in developing cost effective collection programs and refer them to potential processors and/or end users for material. Local governments with the appropriate infrastructure or contracts for commercial hauling can even offer collection and/or processing of film plastic. The Wal-Mart Case Study included in Appendix B describes a patented system for on-site baling of film plastic with other materials that Harmon, the company that holds the patent can make available to other companies. Retail businesses especially can be encouraged to consider backhauling of film plastic and other recyclables to distribution centers.

- **Work with retailers to expand collection locations.**

Collection of plastic bags and other residential film plastics at grocery stores and other retail locations that distribute plastic bags has proven successful in many communities. The State can work directly with statewide retail outlets and with local governments to reach local retailers to encourage more sites like this on a voluntary basis. With the initiatives of the Progressive Bag Affiliates and proposed legislation in Congress to tax plastic bags, businesses may be motivated to add collection locations on a voluntary basis.

Some state and local governments, such as California and Rhode Island, require retail outlets of a certain size to collect and deliver plastic bags (and sometimes other film plastic) for recycling to a designated facility. In the case of Rhode Island, the State Resource Recovery Authority provides containers and signs for collection of the film plastic to reduce costs to the individual businesses. Retail businesses and business associations should be enlisted to help develop potential

policy and infrastructure to take back film plastic from residential generators in Georgia.

■ **Work with national and regional corporations that have a “green” initiative.**

In addition to focusing on individual large generators, draw on national and regional companies with Georgia facilities to determine their corporate interest in recycling film plastic, possibly as part of a larger corporate recycling or “green” focus. Simon, manager of large malls throughout Georgia, for example, is currently focusing on recycling cardboard and fluorescent bulbs. Can they follow same model with film plastic if it can be shown to be cost effective? In addition, large industries and companies with multiple locations in the State could contract with a recycler to increase efficiency and possibly lower recycling costs per ton.

■ **Work with companies baling OCC to add film plastic.**

Work with companies that are already baling OCC to add film plastic, in either in separate or the same bales depending on what their market demands. For large generators with multiple facilities, Harmon’s patented “Super Sandwich Bales” can take additional materials. The State and local governments may be able to play a role in connecting companies that already bale OCC with collectors and/or processors that can accept film plastic with the OCC.

■ **Encourage businesses to work with vendors to take film plastic that they deliver back for recovery.**

Generators may want to consider working with their suppliers to take back film plastic and/or provide a baler for film plastic. For example, Hard Rock Café requires shrink-wrap from deliveries stay on the truck, which provides an opportunity for it to be recycled.

■ **Work with malls and/or anchor stores at malls to aggregate and bale film plastic from individual stores and contract with a collector and recycler.**

Given that the film plastic generated at malls appears to come from the larger “anchor” stores, either the mall management and/or the anchor stores could serve as a coordinator or aggregator of the smaller amounts of film plastic generated by other stores. For example, one baler could be provided for all material generated throughout the mall, especially if savings in disposal costs (and ideally revenue from recycling) could be recognized by the entity coordinating the program.

■ **Work with local governments that may be in a position to develop collection infrastructure using their own forces or through a contractor.**

For example, one of the case studies in Appendix B describes how the Minnesota Chamber of Commerce offers collection of film plastic from retailers that offer film plastic collection to their customers using the services of a not-for-profit organization.

■ **Determine whether it is common practice for food manufacturers to discard remaining film plastic on a roll if a full “run” cannot be completed.**

If so, work with these food manufacturers to recycle instead of dispose of this clean film plastic.

- **Create drop-off points for clean agricultural film in highly agricultural portions of the State.**

Although agricultural, nursery, and greenhouse plastic does not comprise a large amount of film plastic in Georgia, it may be a large amount of film plastic in some heavily agricultural parts of the State. This material could be accepted at drop-off centers, especially if operators could cover costs by charging a tipping fee that is lower than disposal fees. Such a program could be developed in conjunction with organizations such as the Department of Agriculture, Farm Bureau, Cooperative Extension, etc. as it was in the State of New Jersey as described in the case study in Appendix B.

## Market Development

- **Develop State purchasing preferences for products made with recycled film plastic.**

To ensure that end markets for film plastic continue to evolve, the State can review its procurement policies, and provide guidance to local governments regarding their procurement policies, to ensure that products made from film plastic (e.g., plastic lumber) are, at minimum not excluded or disadvantaged and, if feasible, are specified for appropriate uses.

- **Add products made with recycled film plastic and/or equipment to handle film plastic for recycling to State contracts**

To make it even easier for state agencies and local governments to stimulate markets for film plastic by purchasing products made from this material, these products could be included in state contracts.

- **Work with the manufacturers and the businesses that use film plastic to develop markets.**

Engage the industry sectors and individual business that manufacture, distribute, and generate film plastic on continuing to expand the end markets for this material.

## Potential Partnerships

Many of the strategies described above require the involvement of parties other than, or in addition to, state and local government. Specifically, the following actions can be taken to work with others across Georgia to divert more film plastic to recycling.

- **Work with business associations in the State.**

Several state retail associations, in addition to individual retail companies, have announced their support for the Progressive Bag Affiliates' initiative to expand collection of plastic bags and to purchase plastic bags with recycled content to increase demand. Retail, grocery, and recycling organizations, in order to ensure that stakeholders' concerns are being met, and that the program is workable from their member's perspective.

■ **Work with collectors and processors of recyclables.**

Collectors and processors of recyclables in the State have been actively involved in expanding recycling for other materials in the State of Georgia. These private companies can play a role in setting reasonable recycling goals, identifying likely sources of film plastic, and evaluating infrastructure options.

■ **Enlist the expertise and of end users.**

Those companies that turn recovered film plastic into end products have a special interest in maximizing the quantity and quality of material diverted. They have actively worked with local governments, collectors, and processors to develop programs to divert film plastic to their facilities.

■ **Collaborate with landfills and transfer station operators.**

Given that film plastic comprises an estimated 7.4 percent of the waste disposed at the average landfill in Georgia, landfills and transfer stations may have a particular interest in diverting this material from relatively clean loads that they receive. Many of them know which loads are likely to come in with a high proportion of film plastic. For example, in rural Georgia, some loads may contain almost all agricultural plastic at a given time of year and in Dalton, certain loads from carpet manufacturers may have high percentages of clean film plastic. Disposal facilities may be willing to pull out this material from certain loads and, if the equipment is available, bale it for market.

# Appendix A GENERATOR SURVEY SHEET

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## **General Information**

Generating Sector: \_\_\_\_\_

Company Name: \_\_\_\_\_

Location: \_\_\_\_\_

Annual Revenue: \_\_\_\_\_

## **Plastic Film Chemical and Physical Characteristics**

1. From what type of resin is the plastic film made? \_\_\_\_\_
2. What is the melt index (in grams) for the plastic film? \_\_\_\_\_
3. What volume of plastic film does this facility produce? \_\_\_\_\_
4. Is there any prior usage of the plastic film before this final stage? If so, please explain. \_\_\_\_\_

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5. Is there a potential for the waste plastic film to be contaminated? (dirt, chemicals etc.) – What portion of the film plastic is likely to have been in contact with food or organic material? What type of off materials (e.g., meat, vegetables, dry goods, etc.)? If a medical facility, what portion of the film plastic may be considered “contaminated” or “medical waste”?

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## **Plastic Film Process Characteristics**

1. What product is the source of the plastic film? \_\_\_\_\_
2. How is the excess plastic film collected? \_\_\_\_\_
3. How is the excess plastic film disposed? \_\_\_\_\_

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4a. Is the excess plastic film recovered? \_\_\_\_\_

4b. If so, how is this accomplished? Is it done as part of the manufacturing process in an intermediary step or at the end of the process?

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4c. If not, what barrier/complication prevents you from currently recovering the excess plastic film?

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4d. What specific incentive could persuade the recovery of the excess plastic film? (financial, economic etc.)

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**Unique to Agriculture Generator Sector**

*Mulch Film Plastic*

1. Do you produce/collect mulch film plastic? \_\_\_\_\_

2. Do you recover or dispose of the mulch film plastic? \_\_\_\_\_

3. How is this done? \_\_\_\_\_

*Horticultural/Hothouse Film Plastic*

1. Do you produce/collect horticultural/hothouse film plastic? \_\_\_\_\_

2. Do you recover or dispose of the horticultural/hothouse film plastic? \_\_\_\_\_

3. How is this done? \_\_\_\_\_

## Appendix B

# CASE STUDIES OF FILM PLASTIC RECOVERY

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### Wal-Mart's Super Sandwich Bale

As part of Wal-Mart Corporation's long-term sustainability goals, the company aims to generate zero net waste. Wal-Mart has further committed to reduce its global plastic shopping bag waste by an average of 33 percent per store by 2013. This is expected to eliminate more than 135 million pounds of plastic waste globally (or 9 billion bags per existing store). To help reach this goal, Wal-Mart will reduce the number of bags given out by its stores, encourage the use of reusable bags and give customers the ability to continue recycling plastic shopping bags. Wal-Mart and Sam's Club stores and their distribution centers all participate in a recycling program with Harmon, a subsidiary of Georgia Pacific, which owns the patent for the Super Sandwich Bale™. The super sandwich bale stems from the Plastic Sandwich Bale™, which is how Wal-Mart stores baled film plastics (plastic bags, shrink-wrap, and apparel bags, and other loose plastic). A Plastic Sandwich Bale™ has cardboard on the bottom 10 to 20 inches of the compactor, a layer of 9 to 18 inches of plastic in the middle of the bale, and another section of cardboard on top. The bales are then shrink-wrapped to ensure that broken materials do not fall out of the bale. The Plastic Sandwich Bale™ began as a pilot program in September 2004. Since that time, the process has incorporated more types of materials. The patent was purchased by another company, Harmon, and upgraded to include up to 31 recyclable materials (such as plastic pill bottles from the pharmacy, plastic coat hangers, plastic plant containers, books, paper, etc.). The Super Bale™ program began in the summer of 2007. Each material type is bagged separately, then placed in the compactor to be included in a super sandwich Bale™. Bales are then shipped to a MRF in close proximity to the store or distribution center, where they are broken apart and sorted by commodity type for marketing. Approximately 30 to 35 bales weighing around 1,000 pounds each can fit on a trailer truck. As of May 2008, Wal-Mart estimated that the technique had resulted in the company diverting more than 97 million pounds of plastic from landfills. Approximately 97 percent of this plastic is film plastic. In 2008, it is estimated that over 6 million pounds of plastic was generated in the Wal-Mart-owned facilities using the SuperBale™ nationally.

#### Wal-Mart's Super Sandwich Bale™

Plastic Bag, Shrink Wrap and Other Commodity Recycling



Contact: Mike Hagood

479-204-0524

[mike.hagood@wal-mart.com](mailto:mike.hagood@wal-mart.com)

Harmon manages the transportation, processing and marketing of the materials through the MRFs. Wal-Mart receives a share of the revenue or discounted pricing on end users that receive recycled materials from Wal-Mart. Since Harmon began managing the program, Wal-Mart has enjoyed lower per-ton costs, since Harmon is in the recycling industry and knowledgeable about end markets and transportation.

All of Wal-Mart and Sam's Club's 4,400 retail stores and 200 distribution centers recover approximately 12 million pounds each month through the program. The bale process helped overcome the barrier of plastic film being difficult to handle. A barrier the store is currently working to overcome is training. Many associates are not aware of all the material types that can be included in the program. Wal-Mart is conducting online and in-person education sessions to help promote the program.

Wal-Mart also hopes to expand their program to help supplement other recycling programs. Many Wal-Mart stores, for example, are located in rural areas, which often lack recycling collection infrastructure. Wal-Mart has set up a pilot program in Lawrence, Kansas, where residents can drop off their recyclable materials for inclusion in the Super Sandwich Bales™. They are also trying to look at partnerships in other parts of the country, including California, Denver and Houston. In Georgia, there are 137 Wal-Mart stores and 22 Sam's Club Stores in the Super Sandwich Bale™ Program. In addition, there are five Wal-Mart distribution centers that market their OCC through Harmon, and film plastic through regional recyclers. There are an additional five Sam's Club distribution centers and a Wal-Mart return center in Georgia that market recyclables regionally. A Harmon representative indicates that recyclables from northern Georgia that are marketed through Harmon are delivered to the AmeriSouth MRF in Atlanta, and in southern Georgia are delivered to the Smurfit MRF in Jackson, Florida. At these respective MRFs, the materials are unbaled, separated, and re-baled for marketing by commodity type.

End markets for plastic film include domestic and overseas customers, including an end user in Georgia that manufactures artificial pine straw for golf courses.

The Wal-Mart representative indicates that because the Super Sandwich Bale is patented, companies wishing to utilize the process should contact Melissa Dietz of Harmon, at 404-652-6674. [mdietz@gapac.com](mailto:mdietz@gapac.com)



## NJ Department of Agriculture

The New Jersey Department of Agriculture (NJDA) first looked into baling used nursery and greenhouse plastic in the “garden state” in 1991. At that time, long-term markets were not available, so the idea was abandoned until 1997. The NJDA developed the program in March of 1997, and acts as facilitator of the program. Many individuals were consulted at the onset, including farmers, end users, potential processors and the Rutgers University Agricultural Extension staff. Further, organizations such as the Rutgers University Agricultural Extension, The Farm Bureau, and the NJ Nursery and Landscape Association, were called on to help promote the program and disseminate information to farmers and nursery owners about how to properly prepare the plastic film for delivery to the recycling facility (See Figure A). Because plastic film is so large and bulky, proper preparation is important. The NJ program tried to accept mulch film at one point; however, the material was too contaminated and was rejected by the broker. Ultimately, the film found a market (in Asia); however, a NJDA realizes that the material needs to be washed. Recently, such a facility emerged in NJ. The company washed and chipped mulch film and marketed it in China. It will be several weeks, however, until the seller receives feedback that the product met the buyer’s specifications.

There are two collection points in NJ for recovered nursery and greenhouse film plastics – both quasi-governmental recycling facilities:

- The Cumberland County Solid Waste Complex, which charges a tip fee of \$20 per ton; and
- The Burlington County Occupational Training Center (which charges a tip fee of \$25 per ton).

The material gathered through these means is marketed to Poly-America in Texas, which manufactures Hefty trash bags. The market for the LDPE plastic (which is mostly clear and white and is usually about four mils thick) is currently \$0.11 per pound.

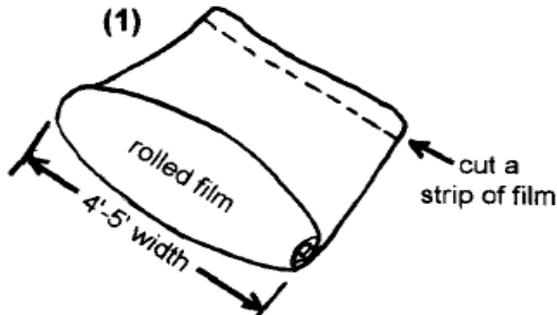
The NJDA contact indicates that 90 percent of commercial agricultural activities take place in these two counties. Tip fees at the landfills and waste-to-energy facilities in NJ ranges from \$65 to \$100 per ton, so the farmers and nursery owners have a financial incentive to deliver the plastic to the recycling centers in order to avoid paying costly tip fees. One large farmer in the state is known to bale his agricultural film using a mobile baler, which reduces the number of staff needed to remove the film (from 8 to 3) as well as the time required to do so (from several hours to just minutes) is known to be marketing his plastic directly to a market in NJ (Eden Rock Recycling), which accepts the material at no charge.

The NJDA estimates that 75 percent of the nursery and greenhouse film generated in the state annually is recovered for recycling (approximately 715,000 pounds per year). To date the program has resulted in diversion of 5.5 million pounds of film plastic. NJDA also facilitates programs to recover plastic nursery pots and plug trays, drip irrigation tape and pesticide containers. The NJ program is successful because it is

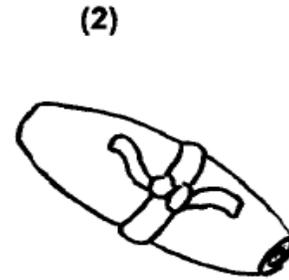
cost-effective for most farmers and nursery owners to deliver their used film to the drop-off centers. With rising fuel prices, however, it may become less cost-effective to do so. The program evolved over time – at first offering seasonal collection, and switching to year-round collection per farmer request in 2005. The NJDA indicates that they only had a few problems with contamination and improper preparation in the beginning however, problems were resolved and have been minimal. When there is a contamination issue, the NJDA is the “go-between” that receives news from the processor, and passes it along to the generator. It is critical that such a program have a facilitator to address such issues. It is also helpful to use organizations and trade associations to help educate farmers and nursery owners about the program.

**NURSERY & GREENHOUSE FILM BUNDLING PROCEDURE**

**OPTION A**

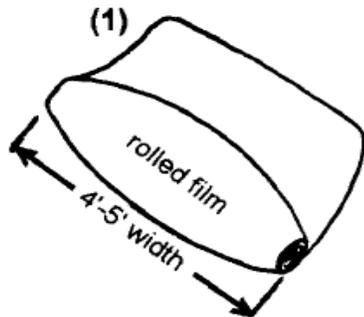


(1) Fold the film into a width of 4-5 feet, roll the film up and then cut off a strip of film from the end of the roll...

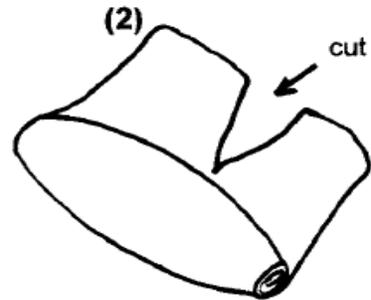


(2) and use the strip of film to tie the bundle.

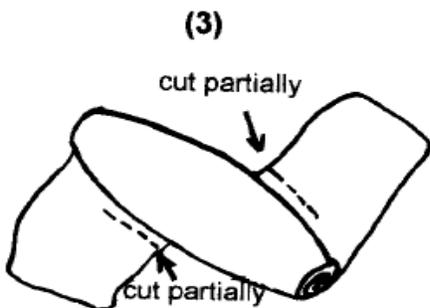
**OPTION B**



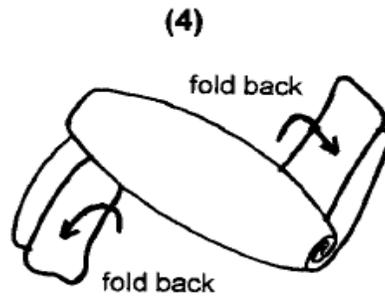
(1) Fold the film into a width of 4-5 feet and roll the film into a bundle...



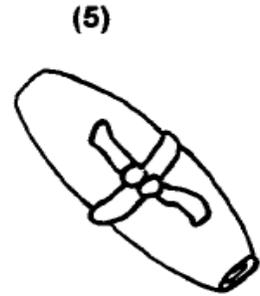
(2) cut the film down the center (the length of the cut will be determined by the diameter of the bundle)...



(3) roll one side of the cut film back under the bundle, cut the film partially (approx. half way)...



(4) fold both pieces of the film back...



(5) and tie the bundle.

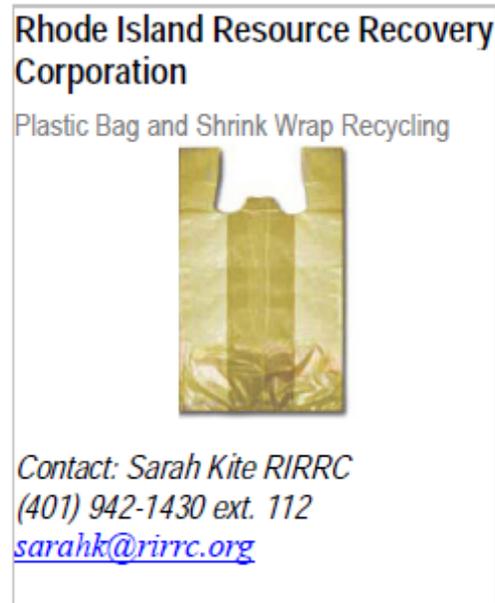
Figure A – NJDA Nursery and Greenhouse Film bundling Procedure

## Rhode Island Resource Recovery Corporation

The Rhode Island Resource Recovery Corporation (RIRRC) originally became interested in plastic bag collection primarily to alleviate litter problems in and around the quasi-governmental entity's landfill. RIRRC researched various options, including bans on plastic bags, credits for plastic bags, and additional taxes on plastic bags. With input from various stakeholder groups, RIRRC decided upon a program that was voluntary for residents but mandatory for retailers meeting specific sizes or sales figures that distribute plastic bags. Since the original law was passed in 2006, it has been amended twice. Provisions of the current law (RI GL §23-18.11-3.1) include:

- Retail outlets with annual sales of at least \$8 million in the aggregate (e.g., at least \$8 million in sales for ALL locations in Rhode Island) or retail establishments with over 10,000 square feet of retail or wholesale space at one location must collect and deliver plastic bags for recycling if they provide customers with plastic bags.
- If retailers (of any size) offer plastic bags to customers, they must also offer paper bags at no additional cost.
- The retail establishment is responsible for the cost and upkeep of the container, as well as for emptying the container and ensuring that the plastic collected is delivered to a recycling facility.
- Retailers are to report to RIRRC where the material is sent each year, by January 31, starting in 2009 for 2008 data.
- The penalty for non-compliance is a fee of up to \$500.
- RIRRC makes available drop-off barrels and signage to all retail outlets. The “Re-Store” barrels are approximately 9.5” in length x 15.5” wide x 38” in height, printed in Spanish on one side. Retailers have been provided with the barrels by the RIRRC. During the first year of the program, RIRRC spent \$385,000 to implement the program – primarily on outreach and education, as well as containers for placement at retail locations.

The main benefit of this program is that it was relatively acceptable by the industry (in fact, many retail customers' demand-recycling services from their retail outlets) and relatively low cost to RIRRC. The challenges with the program are:





1. The law is difficult to enforce, as a reliable database of all stores meeting the criteria is not available (and there are staffing constraints).
2. It is difficult to obtain accurate data regarding the amount of plastic film being recycled, as many retail outlets send the material to their distribution centers for consolidation and later market them directly. The RI law does not stipulate that retailers must participate in the

RIRRC program, just that they must recycle their film plastic. Again, while the retailers are supposed to report this tonnage to RIRRC annually, there is no enforcement in place, and there is no complete database of retailers impacted by the law.

3. Some stores find transportation challenging. While larger retail outlets are beginning to transport plastics collected back to their own distribution centers, smaller, independent stores can find it challenging to deliver the collected material to the RIRRC MRF.
4. The material can be problematic to store and keep contained at the MRF. The RIRRC MRF uses a trash compactor to store the bags until there are enough to bale.

One potential solution to the transportation issue is to arrange a collection through the independent grocer's association or retail association. This was occurring in RI at one point, but ceased. Another option is to ensure that local drop-off programs will accept large quantities of plastic film from commercial generators. Larger retailers in the area, such as Shaw's and Stop and Shop, are returning film plastic to their nearby distribution center for further densifying and/or consolidation before marketing.

RIRRC notes that their program costs have gone down to \$0 for 2009. They say that once implemented, they find that little is needed in the way of education and outreach. RIRRC markets their plastic film to Trex's Winchester, Virginia facility, selling approximately one truckload every nine months. When last marketed they received \$0.15 per pound for their material.

RIRRC notes that the program has resulted in less litter at and around the state's landfill, although that may be due in part to a reduction in the use of plastic bags. Furthermore, citizens are satisfied that they have a means to recycle the plastic bags they generate. Retailers were also satisfied that the program does not involve a fee, tax, or ban on plastic bags. Currently RIRRC is working through local trade organizations to ensure that retailers understand that all plastic film, including shrink-wrap from pallets and other protective plastic film, can be included in the program. RIRRC staff recommends that communities interested in developing a film plastic recovery of their own work with local organizations, such as retail, grocery, and recycling organizations, in order to ensure that stakeholders' concerns are being met, and that the program is workable from the retailers' perspective. It is important to identify any potential partners, as well as any potential legislative issues up front.

## Minnesota Waste Wise

**Minnesota Waste Wise**  
Plastic Bag and Shrink Wrap Recycling



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Minnesota WasteWise, a subsidiary of the Minnesota Chamber of Commerce, began collecting plastic bags from retailers in 2003. The impetus for the program was a request by a large grocery store chain, SuperValue (which has Cub Foods retail outlets in the Twin Cities area), indicated that their customers were demanding such a program. The program is voluntary for both retailers and customers, although the legislature introduced a bill last session trying to make recycling mandatory. This gained the attention of retail associations, and encouraged many retailers to join in on the program. Currently the program is only available in the Twin Cities area.

Through the WasteWise program, grocers, dry cleaners and other retailers can host an “It’s in the Bag” collection bin for consumer plastic bags and other plastic film from business activities, including:

- •Newspaper bags;
- •Dry-cleaning bags;
- •Produce bags;
- •Bread bags with ALL food residue removed
- Cereal bags;
- •Frozen food bags with ALL food residue removed;
- Wrap from paper products (paper towels, etc);
- •Salt bags with rigid plastic handles removed; and
- Shrink-wrap.

All materials must be clean and free of food debris. WasteWise has arranged for a non-profit organization that provides training opportunities to disabled adults to collect (for a \$6 fee), sort (remove contaminants), and market the plastics to an end market. The end market currently in use is Trex, who is reportedly paying \$0.22 per pound for the material.

Retailers pay for their own containers (at a cost of \$141 each, delivered and set up, plus liner bags).

To date the program has resulted in 3.2 million pounds of plastic film being diverted from the disposed waste stream – with the last two years averaging about a million pounds each. Currently there are approximately 100 retail participants, however that

number will decline significantly, as 50 area Cub Stores are expected to begin backhauling plastic film to their distribution centers for consolidation and future delivery to a market.



MN WasteWise indicates that the cost of managing and overseeing the program is about \$15,000 per year. They have been able to obtain corporate sponsors (such as Target Stores, local newspapers) to contribute to the program to cover these costs.

The major benefits of the MN WasteWise program include:

- One million pounds per year of film plastic are diverted from disposal;
- An end product manufacturer is being supplied with valuable feedstock; and
- Work training opportunities are provided to more than 30 adults with disabilities.

The main challenge of the program is transportation logistics. Many haulers and MRFs are not interested in collecting the material, or delivering it to their processing facilities, as plastic film can be problematic to handle.

## Athens-Clarke County Residential Film Plastic Collection

Athens-Clarke County, population 114,000, started collecting film plastic in a school contest held for three months from January to April 2007. Eleven schools, all participating in the County's Green School program, competed in the "Bags for

### Athens-Clarke County Residential Film Plastic Collection

Plastic Bag, Shrink Wrap and Other Commodity Recycling



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Benches" contest to collect the most plastic film "pieces," defined as an individual bag or wrapper. Almost 400,000 pieces were collected in this contest.

The contest was so successful that in 2008, the County followed up with a contest called "Bags for Bears". The contest was so named because if the County schools were successful in collecting at least as many bags as were collected in the "Bags for Benches" contest, then the end user, Trex, agreed to donate playscapes, made from recycled plastic for the bears, bobcats, and otters at the local wildlife park. The cause proved to be a strong incentive. From October 2007 through mid-January 2008, County schools collected more than twice the number of pieces than were collected in the prior year, a total of more than 800,000 pieces equaling 8.2 tons.

Twenty-six schools, some in surrounding counties of Jackson, Oconee, and Oglethorpe participated, each of which served as a drop-off location for the material that the County would then collect. Individuals, too, would donate film plastic at the Recycling Center in the name of a particular school. A local grocer donated an additional 12 bales to the program. The top six producing schools received a plaque, created from recycled plastic with an actual cast of a bear paw on it.

Once the contest was over, the community had become accustomed to recycling their film plastic at the local schools. Five schools continued to provide drop-off locations after the contest but the County does not have enough enclosed roll-offs to place at all drop-off sites. Athens-Clarke County picks up the film plastic once every two weeks. The County also accepts film plastic at two of their drop-off sites, one at the Recovered Materials Processing Facility (RMPF) and one at the Solid Waste Department. The County reports that it is not able to collect film plastic in its curbside program, in part because the operator will not take film plastic mixed with curbside material. The most commonly collected types of film plastic collected include the wrap around paper towels or toilet paper, newspaper bags, grocery bags, dry cleaner bags, and bubble wrap.

The primary costs for the ongoing drop-off program are the driver, who spends one day per week collecting the material and delivering it to the RMPF, and fuel costs.

The County operates a vertical down stroke baler in a corner of the privately operated RMPF that is provided by the end user, Trex. In return for the baler, the County committed to sell the first 100,000 pounds of material to Trex at 8 cents per pound. The revenue for all additional material is based on a market index.

### Lessons Learned:

- The County's contract with the private RMPF operator did not include film plastic so this material could not be handled in the same manner as other residential recyclables. The operator provided space for the County to locate and operate a vertical baler within the RMPF and now the operator has agreed to pull clean bags off the paper processing line and bale and market the material. The County and the operator report that the film plastic on the container line is too contaminated to recover.
- Since it is important for the material to be clean and covered, the County uses enclosed roll-offs at the permanent sites. The County does not have enough enclosed roll-offs for collection at all the drop-off locations. Similarly, because of the strict specifications of the end users for this material, the County is concerned about potential contamination if the film plastic were collected at the unstaffed drop-off sites. Since residents are eager to recycle this material, an unstaffed site is likely to receive food-contaminated or wet bags, at a minimum.
- During the contests, storing large amounts of material was a challenge since the film plastic takes up so much space until baled. The program coordinator describes overwhelming "mountains" of film plastic piled up in the RMPF. The facility operator has agreed to bale and market material in the future.
- Because of the competition between the schools inherent in a contest, it is possible that participants were encouraged to use more plastic bags than necessary, or instead of reusable canvas bags, which may send the wrong message.

The County notes the power of tying the collection efforts to a local community cause, such as the wildlife park. The playscapes also brought visibility and positive attention to Trex, the end user of the collected material and the manufacturer of the playscape equipment.