
# PLASTICS 101

# Plastics – A Life Cycle Approach

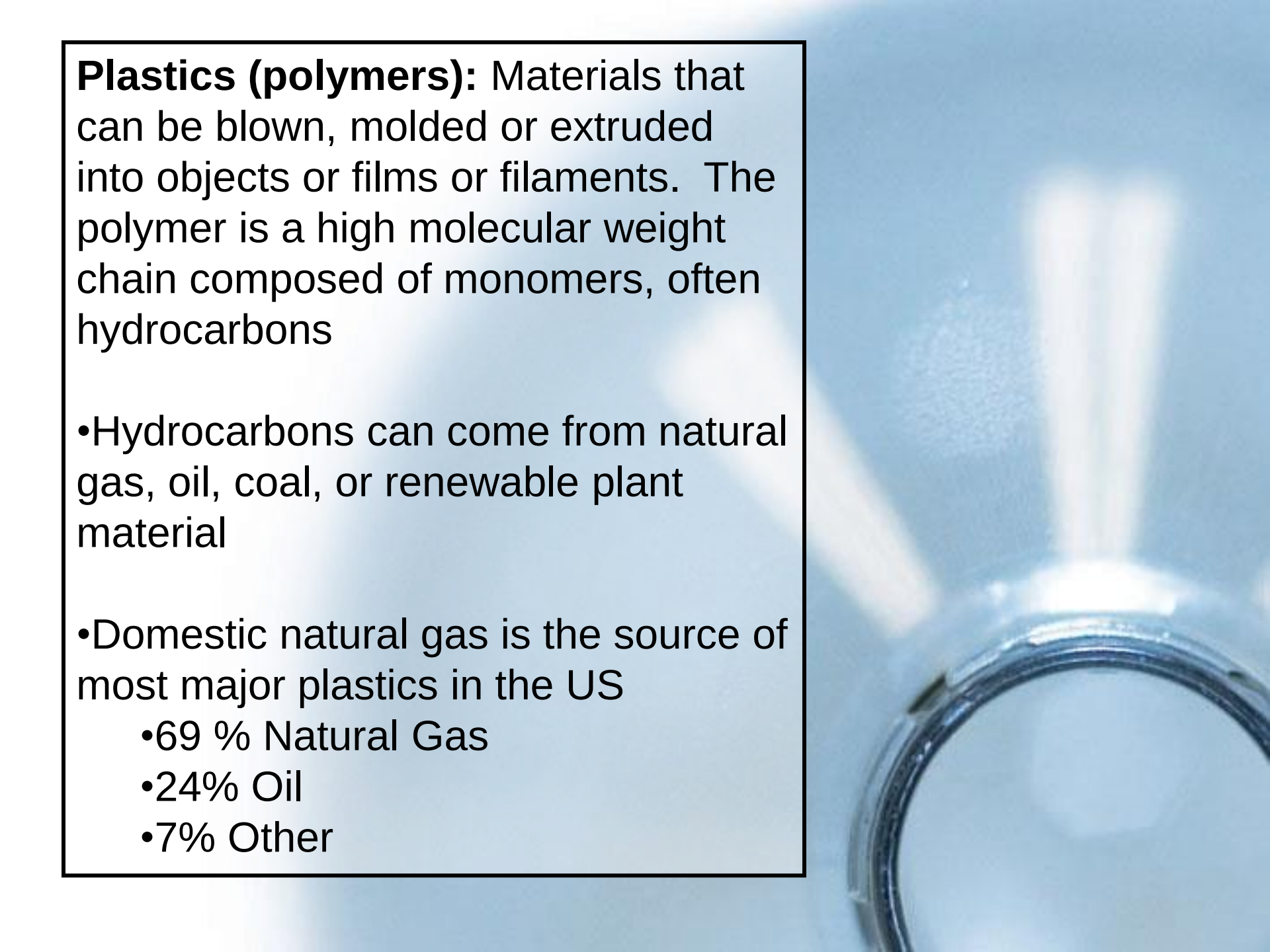
- Plastic materials and uses
- Environmental benefits to using plastic packaging
  - Reduce material use and weight
  - Product protection-freshness
  - Reduce transportation impacts through light weighting
  - Economical
  - Reduce, Reuse, Recycle
- Opportunities
  - Expand collection of rigid containers
  - Promote bag and film recycling

**Plastics (polymers):** Materials that can be blown, molded or extruded into objects or films or filaments. The polymer is a high molecular weight chain composed of monomers, often hydrocarbons

•Hydrocarbons can come from natural gas, oil, coal, or renewable plant material

•Domestic natural gas is the source of most major plastics in the US

- •69 % Natural Gas
- •24% Oil
- •7% Other



# Plastic Packaging Resins

| Plastic | Properties |
|---|---|
|  **Polyethylene terephthalate (PET)** | Clear, Excellent barrier to oxygen, water, and carbon dioxide, High impact capability and shatter resistance, Excellent resistance to most solvents, Capability for hot-filling |
|  **High density polyethylene (HDPE)** | Excellent resistance to most solvents, Higher tensile strength compared to other forms of polyethylene, Relatively stiff material with useful temperature capabilities |
|  **Polyvinyl Chloride** | High impact strength, brilliant clarity, excellent processing performance, Resistance to grease, oil and chemicals |
|  **Low density polyethylene (LDPE)** | Excellent resistance to acids, bases and vegetable oils, Toughness, flexibility and relative transparency (good combination of properties for packaging applications requiring heat-sealing) |
|  **Polypropylene (PP)** | Excellent optical clarity in biaxially oriented films and stretch blow molded containers, Low moisture vapor transmission, Inertness toward acids, alkalis and most solvents |
|  **Polystyrene (GPPS, HIPS, EPS) General Purpose & High Impact and Expanded Polystyrene** | Excellent moisture barrier for short shelf life products, Excellent optical clarity in general purpose form, Significant stiffness in both foamed and rigid forms, Low density and high stiffness in foamed applications, Low thermal conductivity and excellent insulation properties in foamed form |
|  **OTHER (Including Polycarbonate Polylactic Acid (PLA))** | Dependent on resin or combination of resins |

# Plastic Packaging Resins

| | Plastic | Applications |
|---|---|---|
|   | **Polyethylene terephthalate (PET)** | Plastic bottles for soft drinks, water, etc. Food jars for peanut butter, jelly, jam and pickles. Microwavable food trays. |
|   | **High density polyethylene (HDPE)** | Bottles for milk, water, juice, cosmetics, shampoo, laundry detergents, etc.. Bags for groceries and retail purchases |
|   | **Polyvinyl Chloride** | Rigid applications include blister packs and clamshells.<br>Flexible bags for bedding and medical, deli and meat wrap and tamper resistance. |
|   | **Low density polyethylene (LDPE)** | Bags for dry cleaning, bread, frozen foods, fresh produce, and household garbage. Shrink wrap and stretch film. Coatings for paper milk cartons and hot and cold beverage cups. Lids. |
|   | **Polypropylene (PP)** | Containers for yogurt, margarine, takeout meals, and deli foods.<br>Medicine bottles. Bottle caps and closures. Bottles for catsup and syrup |
|   | **Polystyrene (GPPS, HIPS, EPS) General Purpose & High Impact and Expanded Polystyrene** | Food service items-cups, plates, bowls, cutlery, hinged takeout containers (clamshells), meat and poultry trays. Protective foam packaging for furniture, electronics and other delicate items. Packing peanuts, known as “loose fill.” Compact disc cases and aspirin bottles. |
|   | **OTHER (Including Polycarbonate Polylactic Acid (PLA))** | Dependent on resin or combination of resins |

# Why Do We Use Plastics?

- Reduce Material Use and Weight
- Maintain Freshness
- Reduce Breakage
- Reduce transportation costs through light weighting
- Economical

# Plastics also have positive environmental attributes

Plastics reduce energy use by 61% and greenhouse gas emissions by 57% across variety of applications compared to alternatives.[1]

[1] Denkstatt, “The impact of plastics on life cycle energy consumption and greenhouse gas emissions in Europe,” June 2010

# Wisconsin and Plastic Manufacturing

- Wisconsin is home to plastics manufacturers that **directly employ nearly 39,800 people**.
- Wisconsin is ranked **8th nationally** in plastics industry employment.
- It is home to a number of plastics dependent industries that use plastics to make various products.
- **Direct and dependent industries combined employ more than 515,000 in Wisconsin.**

 *Sources: Bureau of Labor Statistics, Harris InfoSource, Moore Economics, Probe Economics*

# Wisconsin and Plastic Manufacturing

- The plastics industry's direct payroll in Wisconsin is $1.6 billion.
- Plastics dependent industries add another $12.9 billion to the state's payroll.
- Together, plastics companies and those industries that depend on plastics contribute $2.3 billion in state and federal personal income taxes and $2.2 billion in payroll taxes.

 *Sources: Bureau of Labor Statistics, Harris InfoSource, Moore Economics, Probe Economics*


Fresh

# Plastics help keep food fresh, reducing waste and protecting products from farms to grocery shelves to kitchen tables.

Protecting the safety and integrity of the product are among the important aspects of sustainable packaging.

90% of energy in product life cycle, only 10% packaging.

# How About Them (Wrapped) Apples?[1]

**New York Times, February 8, 2010**

**“**1.5 grams of plastic wrap extends a cucumbers shelf life from 3 to 14 days”

“Apples packed in a shrink wrapped tray cut down on fruit damage (and discard) by 27 percent.”

“when it comes to saving energy and reducing greenhouse gas emissions, our behavior in the kitchen far outweighs the environmental impact of whatever packaging happens to surround the product.”

Consumers toss out vastly more food than we do packaging

U.S. consumers throw out about half the food they buy. [2]


1:http://freakonomics.blogs.nytimes.com/2010/02/08/how-about-them-wrapped-apples/

2: http://www.siwi.org/documents/Resources/Policy_Briefs/PB_From_Filed_to_Fork_2008.pdf


# Reduce

# Plastics News

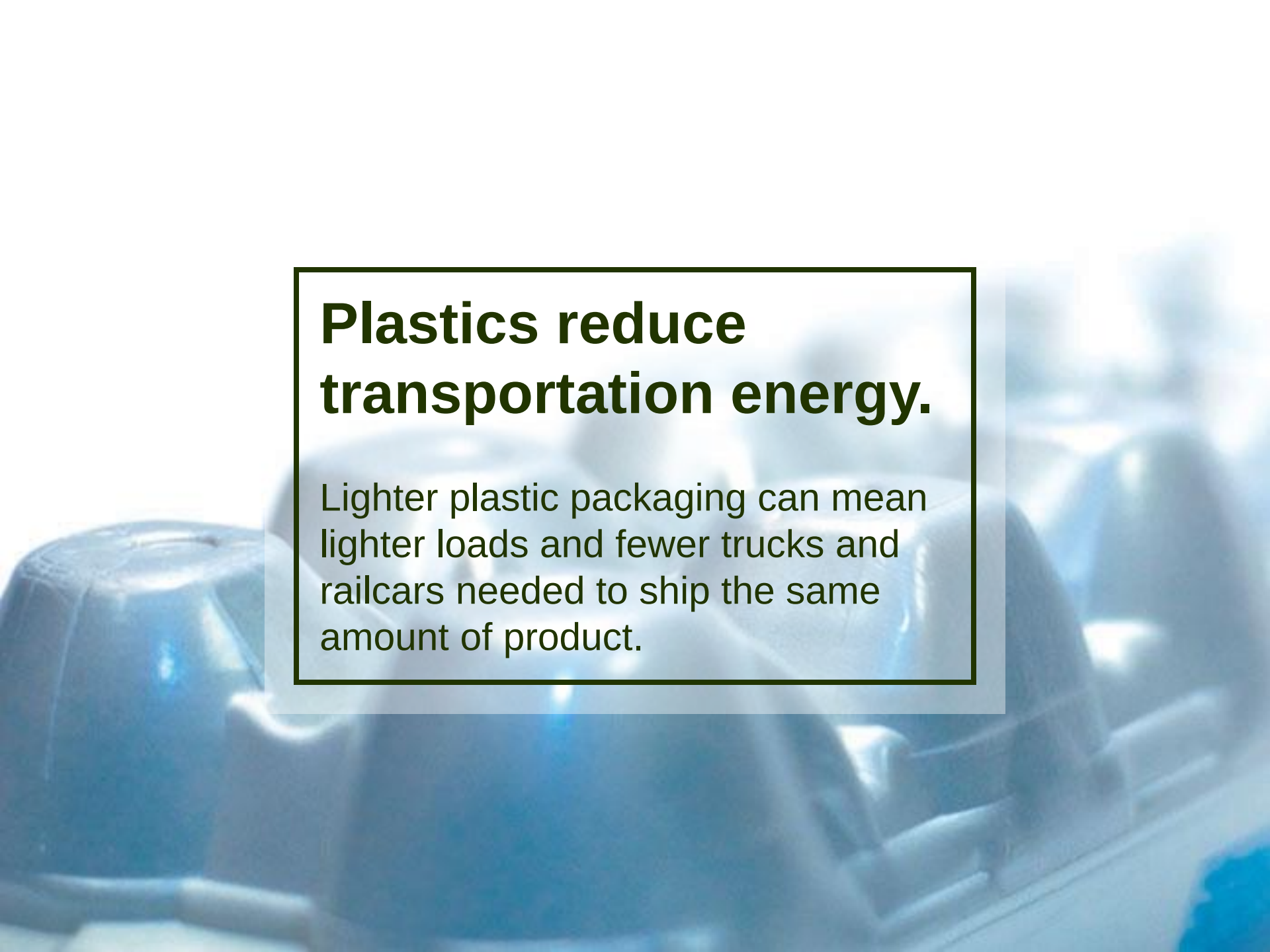
Kraft® switched its classic Miracle Whip® jar from glass to plastic

- Decreasing fuel consumption by 87,000 gallons annually
- The switch to plastic means fewer trucks on the road since six more pallets of product fit on each truckload

# Plastic innovations

Pepsi® announced new “Eco-fina” water bottle

- 50 percent less material
- Innovation reduces 75 million pounds annually



# Plastics reduce transportation energy.

Lighter plastic packaging can mean lighter loads and fewer trucks and railcars needed to ship the same amount of product.

Reusable

Some plastic packaging applications, such as storage bins, sealable food containers, refillable sports bottles and dispensers are designed to be reusable.

**The durability of plastic makes it a preferred material for reusable items.**

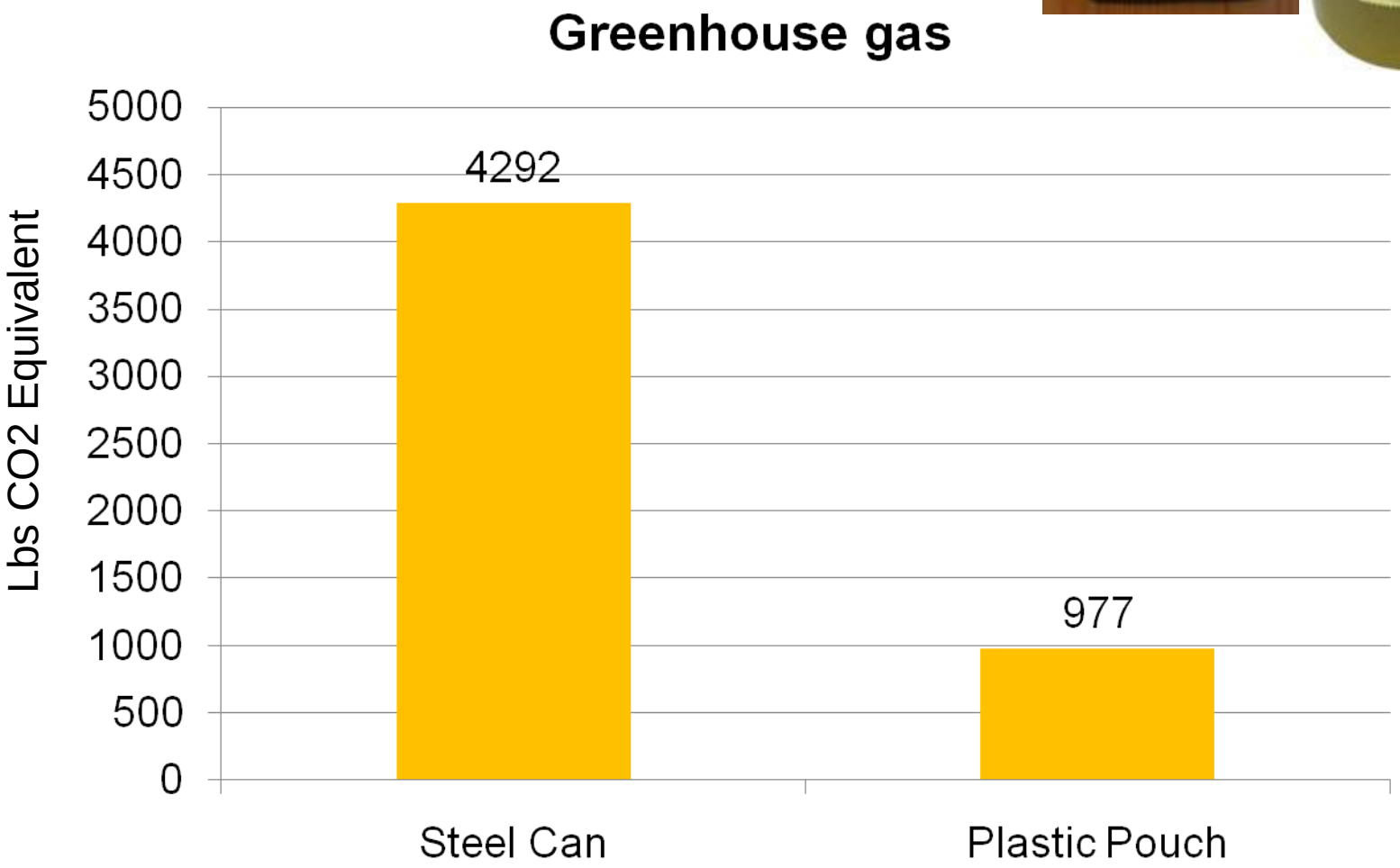
Plastic crates and pallets are used repeatedly, prized for their durability and their ability to resist moisture and insect infestation.

- 92 percent of consumers reuse plastic shopping bags

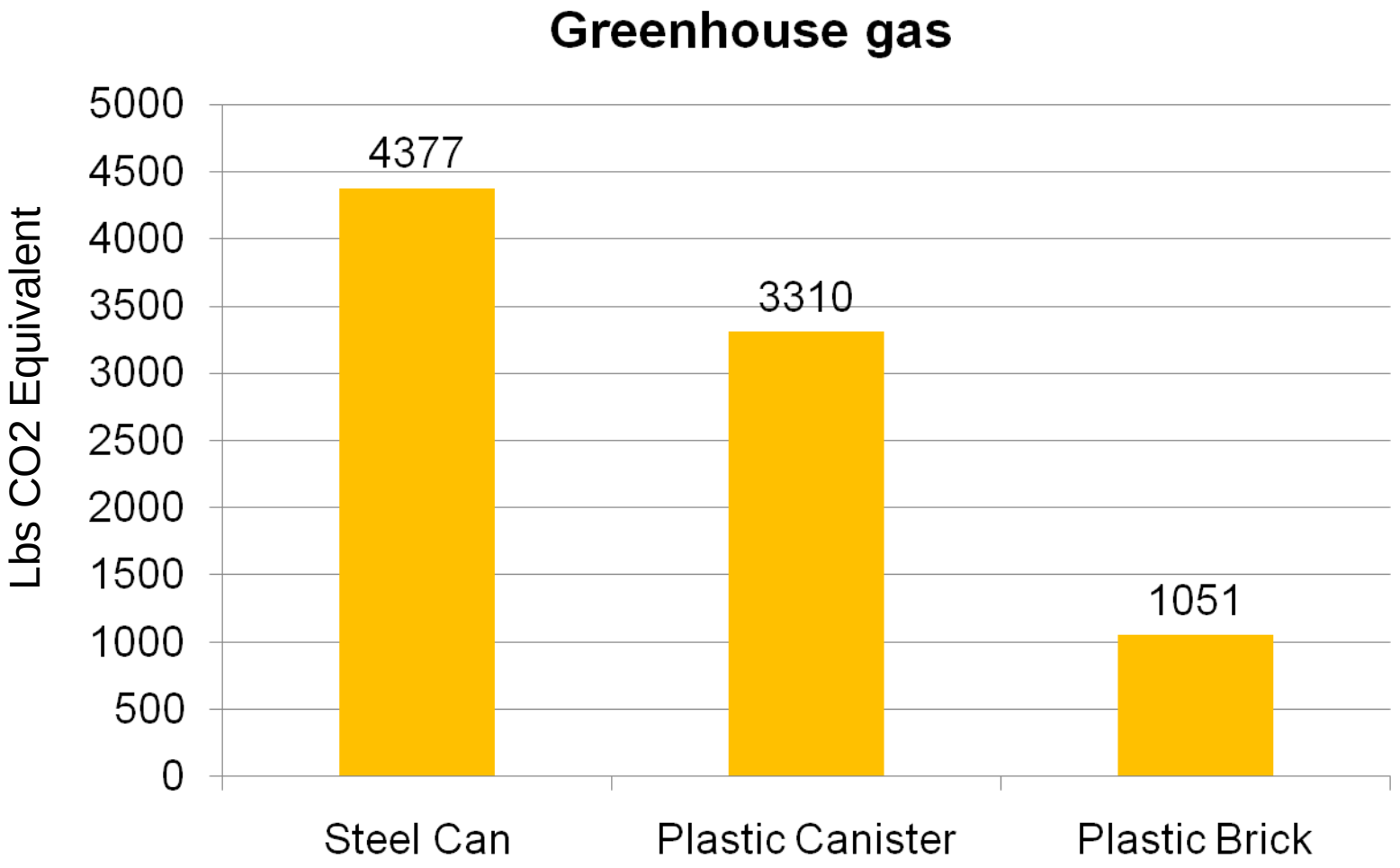
- 50 percent of polystyrene loose-fill is reused


# SUSTAINABILITY CASE STUDIES

# Life Cycle Inventory
## Tuna in Can/Flexible Pouch



# Life Cycle Inventory
## Coffee Packaging



# Plastic Recovery

**Since the early days of plastics recycling in the 1970s, the nation's recycling infrastructure has grown dramatically.**

# Recycling Success

Today, over 80% of U.S. households have access to plastic recycling programs.

According to US EPA data over 4 billion pounds of plastic are recycled annually.

In 2008 more than 2.4 billion pounds of plastic bottles were collected for recycling.[3]

More than 62% of Californians have curbside recycling of all plastic containers. [6]

[3] "2008 National Post-Consumer Plastics Bottle Recycling Report," published 2009.
6 ACC 2008 United States National Post Consumer Report on Non-Bottle Rigid Plastics Recycling, published 2010

# Recycling Success

More MRFs are deploying optical sorting technology and moving towards single stream systems.

Cities continue to expand their recycling collection to include non-bottle rigids.

Over 832 million pounds of bags and film were recycled in 2008—up 28 percent since 2005.[6]

6 ACC 2008 United States National Post Consumer Report on Non-Bottle Rigid Plastics Recycling, published 2010

# Bags and Film Recycling New But Growing Fast

Over 15,000 Drop-off locations Nationwide.

Polyethylene Bag and Film recycling rate DOUBLED since 2005--now about 13 percent according to EPA.[5]

Recovered plastic bags and wraps can be recycled into many useful products, including durable backyard decking, fencing, railings, shopping carts and, of course, new bags.

In store collection Infrastructure is critical for wraps.



6 ACC “2008 National Postconsumer Recycled Plastic Bag and Film Report”, Published 2010

5 US EPA Municipal Solid Waste in the US Facts and Figures, 2007

# Recycling Success

Existing plastic recycling, particuarly PET and HDPE, results in significant savings in energy and greenhouse gas emissions

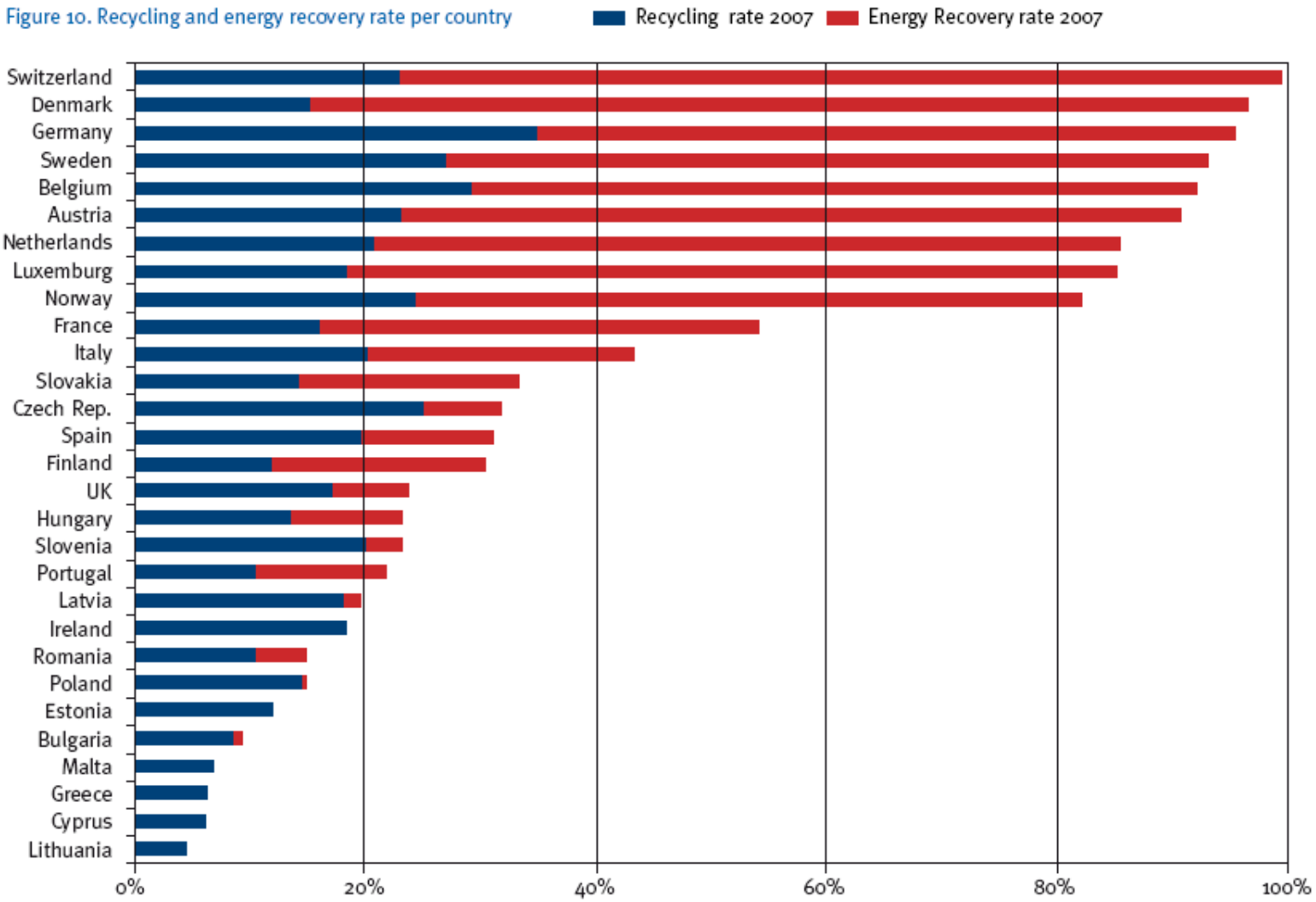
- The amount of energy saved by recycling PET and HDPE containers including bottles in 2008 was the equivalent to **the annual energy use of 750,000 U.S. homes**.

- The corresponding savings in greenhouse gas emissions was an amount **comparable to taking 360,000 cars off the road**[4].

[4] **"Final Report—Life Cycle Inventory of 100% Postconsumer HDPE and PET Recycled Resin from Postconsumer Containers and Packaging**," published 2010.

## Higher Recovery is Possible

- Increased mechanical recycling
- Organics recycling through composting
- Energy recovery from waste

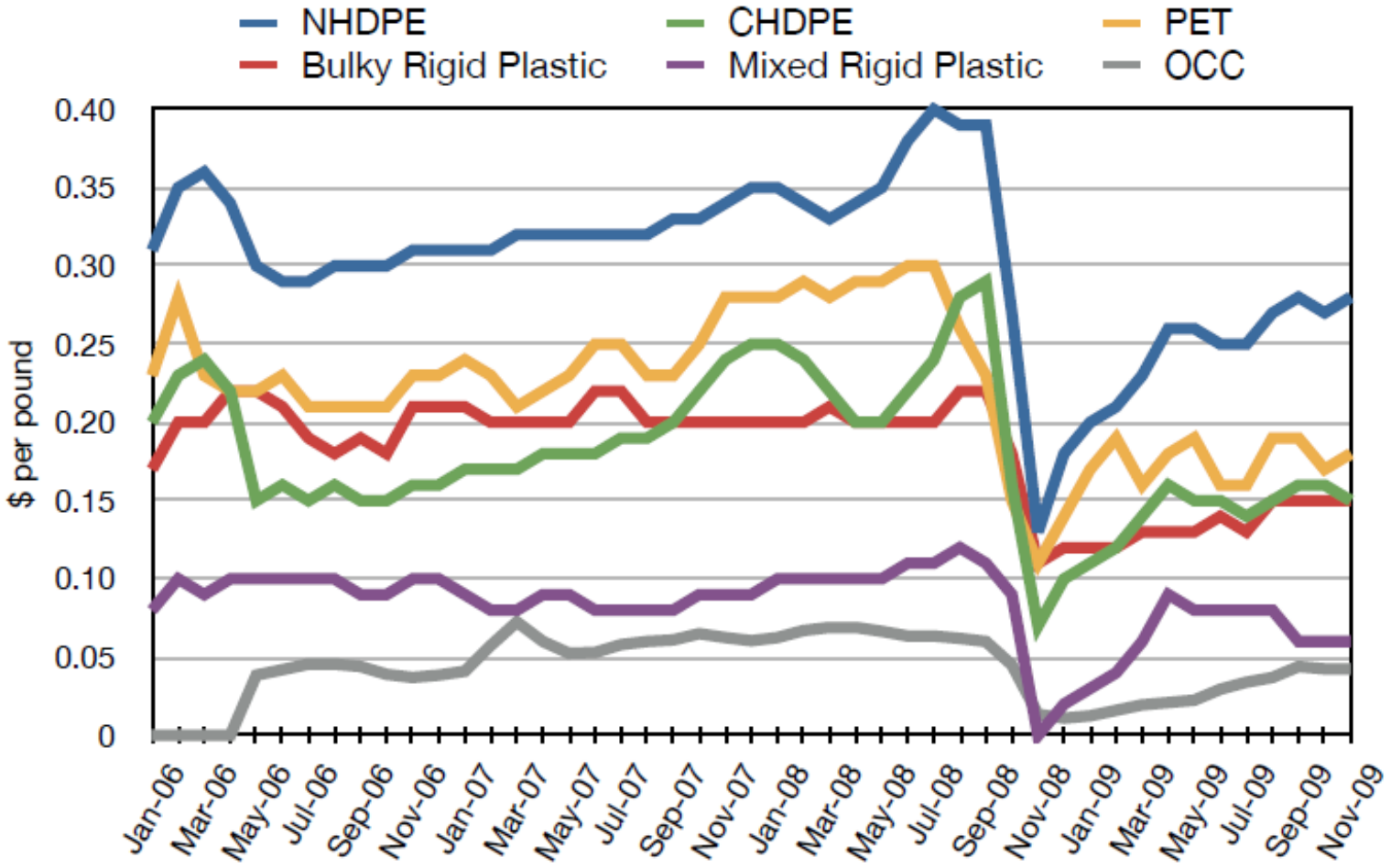



Source: Plastics Europe

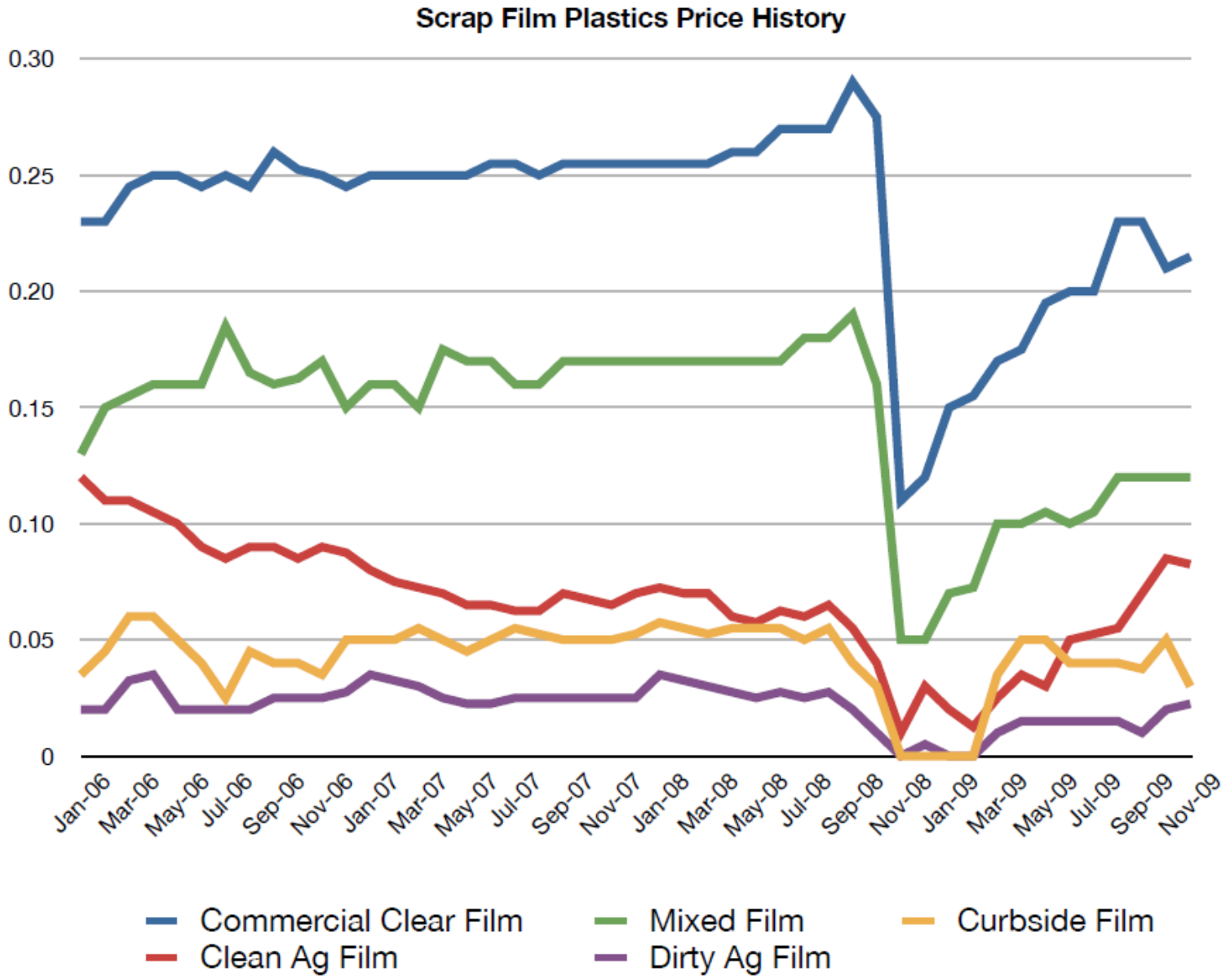
# Recovery Opportunities

- Expand collection of rigid containers
- Promote bag and film recycling

# Recovered Plastic: a Valuable Commodity




Source: Moore Recycling Associates, 2010




Source: Moore Recycling Associates, 2010

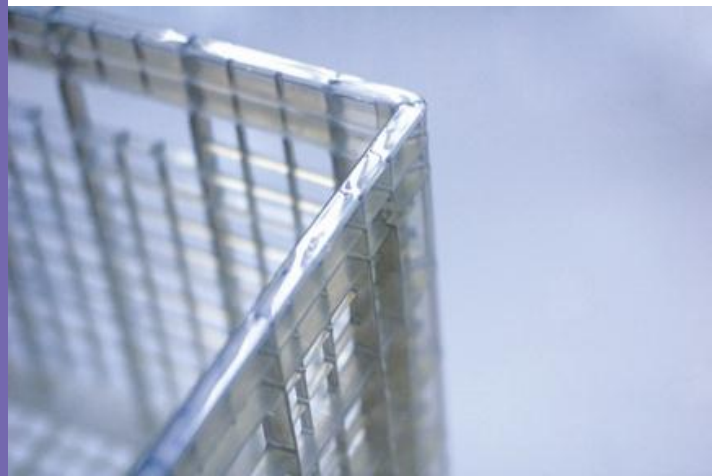
# Non-Bottle Rigids—New and Growing Fast

ACC is working to expand collection of non bottle rigid containers.

Over 361 million pounds of non bottle rigid plastics collected in 2008—up 11% from 2007.[6]

Communities around the country adding to their programs—NYC, Philadelphia, Communities throughout Connecticut.





6 ACC 2008 United States National Post Consumer Report on Non-Bottle Rigid Plastics Recycling, published 2010

# Opportunities to Increase Non-Bottle Rigid Plastic Recycling

**American Chemistry Council (ACC) Efforts**

- Documenting the availability of raw material
- Detailing the types and efficacy of plastic recycling technologies
- Illustrating depth of current and potential demand for products

**Association of Post-Consumer Plastics Recyclers (APR) Efforts**

- Need for consistent, clear education – APR Rigids definitions project
- Enforceable reclaimer-generated bale specifications
- Working with grocers to learn amount of rigids in their stores and working to create solutions for recycling

# Bag & Wrap Recycling Resource

# Programs to Enhance Bag Recycling, cont.

"**A Bag's Life**"—A voluntary public education program to increase plastic bag recycling and reuse in the state of Florida. Partners in the effort include the Florida Department of Environmental Protection, the Florida Recycling Partnership, the Florida Retail Association, PBA/ACC and other major grocery and retailers including Walmart and Publix.

"**Bag Your Bags. Bring 'Em Back**"—**King County (WA)** Solid Waste Division is sponsoring this program to enhance plastic bag recycling in partnership with several major grocers in the county's 37 cities (also promoting recycling of paper bags and use of reusable bags).

"**Bring It Back Philly**"—A public education campaign to increase awareness of the recyclability of plastic bags and locations for recycling bags and wraps. Spearheaded by a Philadelphia council member, this program is supported by Keep Philadelphia Beautiful, the PA Food Merchants, Penn Jersey Paper, PBA/ACC, Goodwill Industries and Trex.

"**Got Your Bags**"—An effort by Keep **California** Beautiful which has launched pilot programs in major cities in state to promote recycling of plastic bags and use of reusable bags. PBA is co-sponsoring this program with local grocers and the state waste authority.

**Lake County, Illinois**—A voluntary at-store pilot program is underway to increase plastic bag and film recycling. This program is co-sponsored by local retailers, legislators, recyclers and PBA/ACC.

# Programs to Enhance Bag Recycling, cont.

"It's In the Bag"—**Minnesota's successful** plastic bag and film recycling program sponsored by the state chamber, state recyclers association and local grocers/retailers. It has been expanded to Duluth (employs handicapped adults as service providers).

**Iowa's "Build with Bags"**—A bag recycling program to convert plastic shopping bags into recycled products for parks and schools. It is sponsored by the state grocers assn., waste authority, Keep Iowa Beautiful and Dept. of Natural Resources. A unique component of this program is that it provides grants to schools and parks to purchase recycle plastic playground equipment and benches.

**Bag Central Station** created convenient, efficient and effective bag recycling opportunities in **Arizona**. Since its inception in 2007, there are now 13 Arizona retailers hosting Bag Central Station in 6 cities.

**Austin's Got A New Bag is a KAB education campaign to promote the use of reusable shopping bags and disposable bag recycling.**

# In Conclusion

- Utilize life-cycle thinking
- Plastic packaging has environmental benefits…
  - Reduce Material Use and Weight
  - Product protection-Freshness
  - Reduce transportation costs through light weighting
  - Economical
  - Reduce, Reuse, Recycle
- ACC focuses on end of life issues
  - Opportunities to increase rigid container recycling
  - Expand promotion of bag and film recycling

# Read:  For More Information

ACC Plastic Resins Life Cycle Inventories Cradle to Gate for major resins

Visit www.americanchemistry.com/plastics

or contact Ashley Carlson at (703) 741- 5125, Ashley_carlson@americanchemistry.com

American® Chemistry Council