

Plastic Packaging and Sustainability





Plastic Packaging Sustainability

Plastics Division





Overview

- Plastic raw materials, resins
- Key plastic sustainability benefits
 - Product protection-Freshness
 - Reduce
 - Reusable
 - Recyclable
- Sustainability Case Studies
- Conclusion



Plastics are:

- a valuable choice for your bottom line,
- a responsible choice for the environment, and
- in many applications the right choice for sustainability goals.



PLASTICS 101

Plastics (polymers): Materials that can be 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



Why Do We Use Plastics?

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



Plastics also can have superior environmental attributes


Plastics reduce energy use by 26% and greenhouse gas emissions by 56% across variety of applications compared to alternatives.¹

¹ GUA - Gesellschaft für umfassende Analysen, "The Contribution of Plastic Products to Resource Efficiency," Vienna, 2005





Fresh

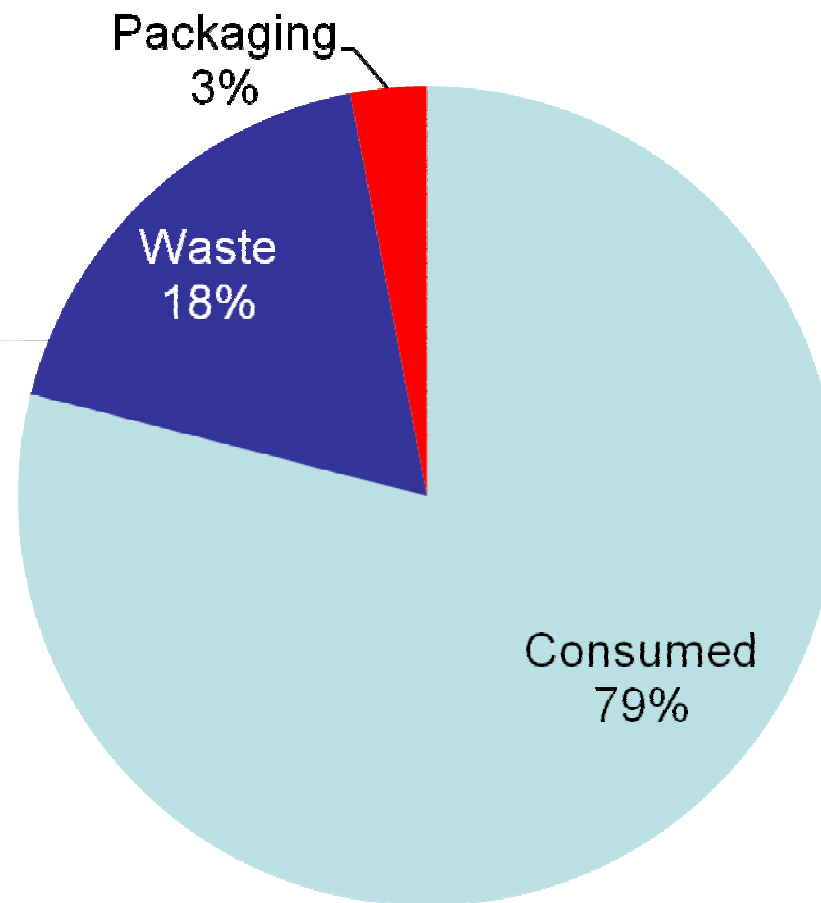


Plastics help keep food fresh, reducing waste and protecting products from farms to grocery shelves to kitchen tables.

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

Plastics Reduce Energy Use by Extending Shelf Life



Energy Used 700 gram loaf of bread, source STFI-Packfork



Reduce

Wal-Mart Goal

- “Our Packaging Network aims to reduce the amount of packaging in our supply chain by 5 percent by 2013”

Reduced Package Weight Positively Impacts 6 of 9 Metrics in Packaging Scorecard Directly:

- Greenhouse Gas Metric
- Sustainable Material Metric
- Average Distance to Transport Metric
- Package to Product Ratio Metric
- Recycled Content Metric
- Recovery Metric

Plastics News 6/20/08

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

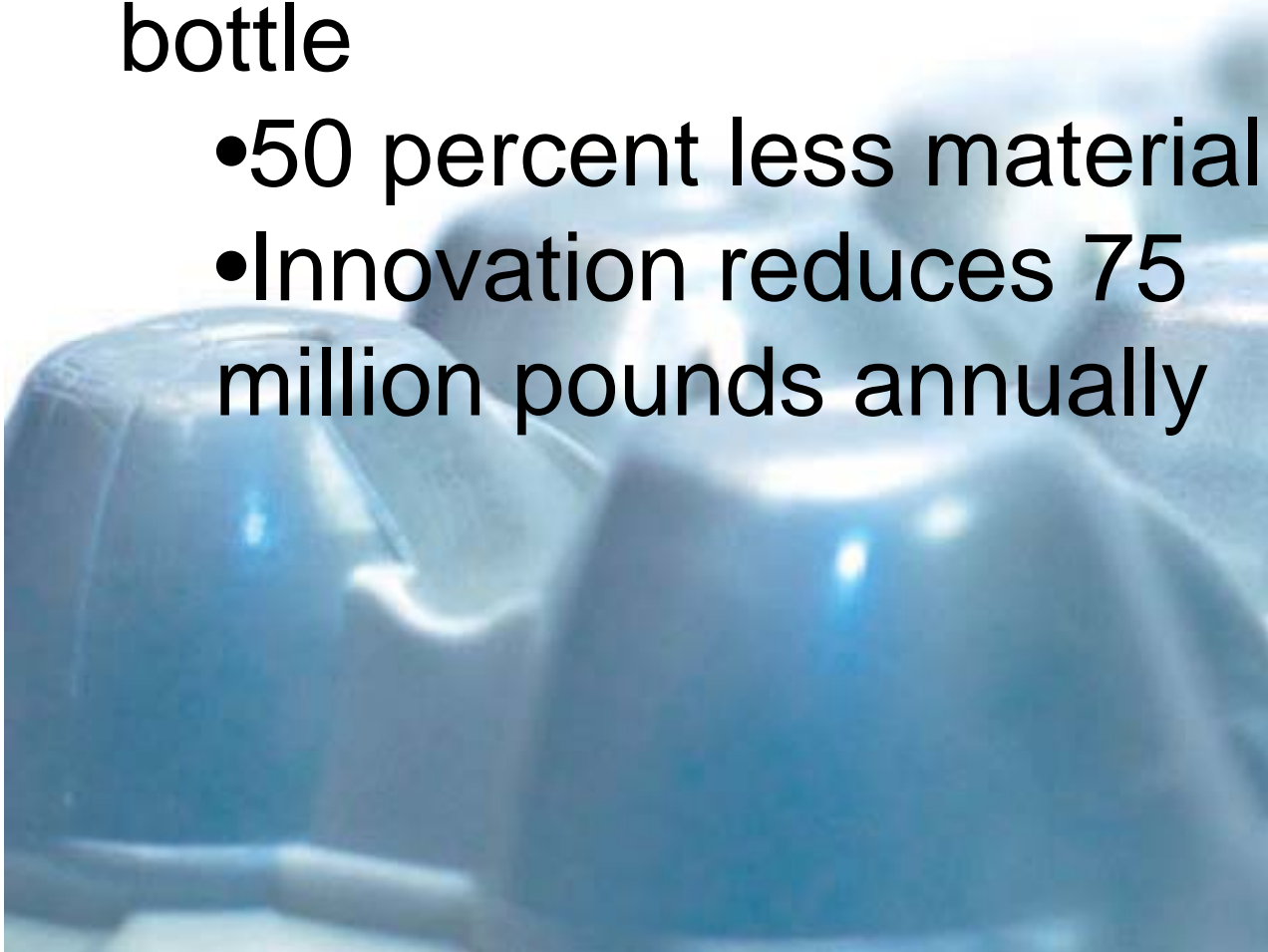
- Decreasing fuel consumption by 87,000 gallons annually
- The switch to plastic means fewer trucks on the road since six more pallets of product fit on each truckload



Plastic innovations

Pepsi® announced in March 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.

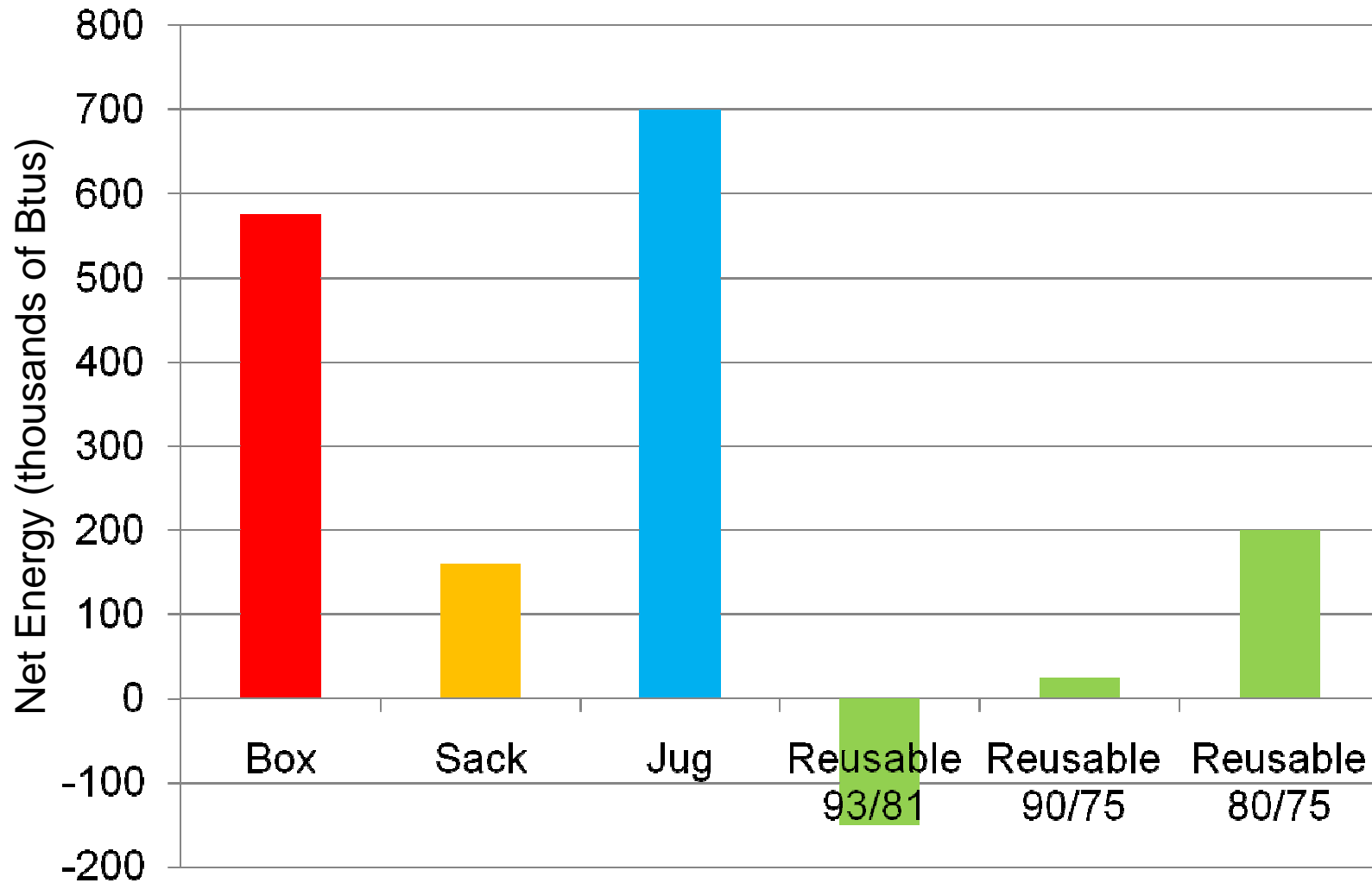
Plastic crates and pallets are used repeatedly, prized for their durability and their ability to resist moisture and insect infestation.

- 92 percent of consumers reuse plastic shopping bags

- 50 percent of polystyrene loose-fill is reused



Reuseable Plastic Pail Can Save Energy



Source: Franklin Associates and Ropak, Nov 2007, replacing 1.82 pound pail



RECYCLABLE



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 were recycled in 2007.

In 2007 more than 2.3 billion pounds of plastic bottles were collected for recycling.³

³ "2007 National Post-Consumer Plastics Bottle Recycling Report," published 2009.



Non-Bottle Rigids— New and Growing

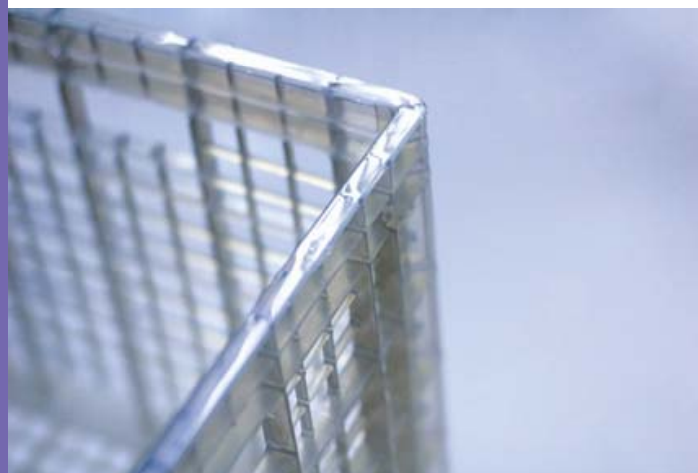
ACC is working to expand collection of non bottle rigid containers.

About 1/3rd of 100 largest communities collect non-bottle rigids

Nearly 50% of California communities ask for all plastic containers

Over 325 million pounds of non bottle rigids collected in 2007⁶

6 ACC 2007 United States National Post Consumer Report on Non-Bottle Rigid Plastics Recycling, Published 2009



Bag & Wrap Recycling Resource

plasticbagrecycling.org

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Home

Consumers

Businesses

Recycling Coordinators

Recyclers

Retailers

The online resource for plastic bag and film recycling



Consumers ▶

In this section you will find general information about plastic bag recycling including what material is readily recyclable as well as a list of retailers that offer plastic bag recycling.

[» Learn More](#)

Businesses ▶

In this section you will find a comprehensive guide to plastic film and bag recovery. You can find specific information such as plastic film types, recyclers, and how to calculate the economics of recovery.

[» Get Started](#)

Recycling Coordinators ▶

Since plastic bags and film are a relatively new recycling commodity, many businesses and recyclers are not yet aware of the option and opportunities to recover it. More information in the marketplace may facilitate recovery programs.

[» Tips for Increasing Film Recovery](#)

Recyclers ▶

Let businesses and other commercial generators of plastic scrap film know about your services by listing in our directory. For information about how to set up a recovery program go to the business section.

[» List Information](#)

Retailers ▶

Consumers are increasingly asking where they can recycle their plastic bags. Grocers and Retailers can help through education, providing recycling bins in convenient locations, and listing in our directory.

[» Learn More & List Your Store](#)

Sponsors & Partners ▶

Learn about other organizations that support plastic bag and film recycling.

[» Learn More](#)





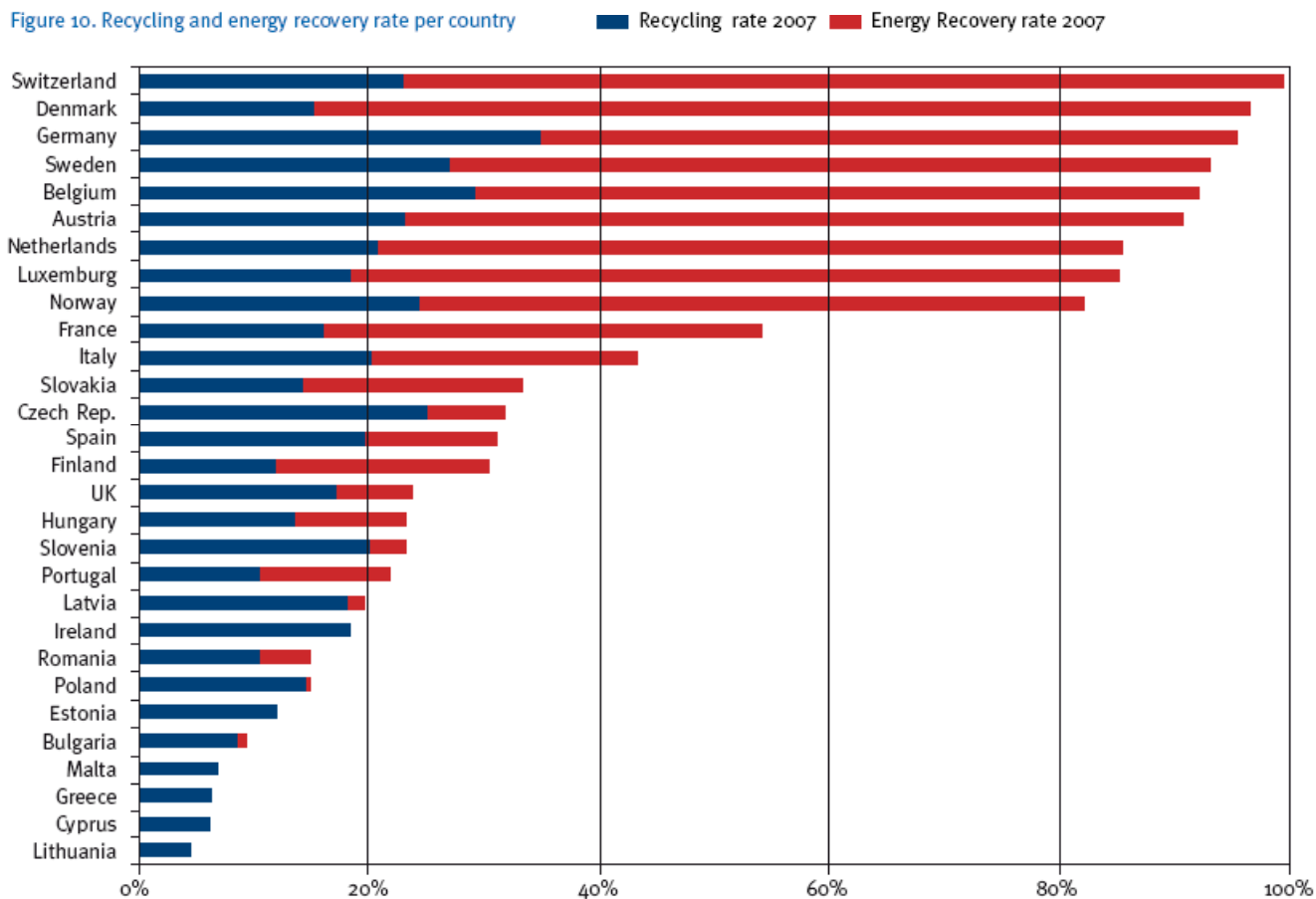
New Bins in San Diego & LA



Higher Recovery is Possible

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

Figure 10. Recycling and energy recovery rate per country



Source: Plastics Europe



SUSTAINABILITY CASE STUDIES

Life Cycle Inventory

Tuna in Can/Flexible Pouch



Table 1

**TOTAL ENERGY, TOTAL SOLID WASTE, AND GREENHOUSE GASES
FOR 100,000 OUNCES OF TUNA CONSUMED**

Tuna Packaging Systems	<u>Total Energy</u>	<u>Total Solid Waste</u>		<u>Greenhouse Gases</u>
	(MM Btu)	(lb)	(cu ft)	(lb of CO2 equivalents)
12-oz. Steel Can (1)	22.7	1,333	44.0	4,292
12-oz. Pouch	9.3	346	10.5	977
6-oz. Steel Can (1)	24.1	1,413	46.6	4,551
3-oz. Pouch	25.2	936	28.4	2,647
3-3-oz. Steel Cans in Paperboard Sleeve (1)	43.2	2,562	83.6	7,518
2-2.8-oz. Plastic Cups in Paperboard Sleeve	28.2	1,106	37.8	1,702

(1) End-of-life for the steel cans are modeled as 62% being recycled and 38% going to a landfill. The paper labels are assumed to be incinerated during steel recycling. Ash from the incineration of the labels is included in solid waste.

NOTE: The end-of-life for all other material is modeled as 80% going to a landfill and 20% combusted with energy recovery.

Source: Franklin Associates, a Division of ERG calculations using the Franklin Associates database and the U.S. LCI Database.

Wal-Mart Scorecard Tuna in Can/Flexible Pouch



- 12 oz. plastic pouch best overall
 - improved 7 of 9 metrics
 - 20% better than 3 oz pouch
 - 80% better than 3-3oz steel can
- 3 oz. pouch second
- 2-2.8 oz plastic cup third

Package Modeling

WAL-MART
WAL-MART
Wal-Mart Stores, Inc.
Package Modeling

1.3.0.4

Wal-Mart Stores Inc. Package Modeling
Modeling your package allows you to experiment with different materials to see how they can improve your score as well as help the environment.

Save & Calculate
To save a package or model, click the 'Save & Calculate' button.

Step 1: Create a Package
Click here to create a package that you wish to model. When finished, click the "Save & Calculate" button.

Step 2: Create a Model
Select a package in the library below and click here to create a new model for it.

Package & Model Library
Use this hierarchy to find the package you would like to model, or click an existing model name to review.

Package & Model Properties

Package & Model Scores

Metric	Package Score	Model Score
Greenhouse Gas Emissions from Package Production	0.00009274	0.00000000
Sustainable Material	0.00002768	0.00132228
Average Distance to Transport Material	0.00003384	0.00129274
Package to Product Ratio	0.00003284	0.00129274
Cube Utilization	0.133	0.259
Recycled Content	0.00006193	0.00015138
Recovery	0.00117354	0.00276485
Renewable Energy to Power Each Facility	0	0
Innovation Different from Energy Standard	0	0
Weighted Score:	10.0000	1.0000

Equivalents

Scorecard Questions

Background & Product Info.

What is the consumer meaningful unit of measure (CMU)? 10 Ounce

Selling Unit Packaging materials

What is the percentage of cube utilization? 741

How many selling unit packaging materials are used? 2 Material(s)

What is the first packaging material? HDPE

What is the total weight per package for this material? 13.3 grams

How far did this material travel before packaging occurred? Under 500 Miles or Under 804 Kilometers

What is the second packaging material? Recycled Folding Boxboard

What is the total weight per package for this material? 130 grams

How far did this material travel before packaging occurred? Under 500 Miles or Under 804 Kilometers

Transport Packaging Materials

Is this item a break pack? Yes No

What is the percentage of cube utilization? 1

How many materials are used to transport the selling unit package? 2 Material(s)

What is the shipping solution for this package? Pallet Use Pallet (ie. One-way, odd-size, etc.)

Life Cycle Inventory Milk Bottles



FreeDigitalPhotos.net

TOTAL ENERGY, POSTCONSUMER SOLID WASTE, AND GREENHOUSE GASES FOR THE USE OF 10,000 HALF-GALLON MILK CONTAINERS

	Total Energy	Postconsumer Solid Waste		Greenhouse Gases
	(MM Btu)	(lb)	(cu ft)	(lb of CO2 equivalents)
Half-gallon milk container systems				
PLA Bottle (1)	67.2	1,061	80.7	5,968
Gable Top Carton (1)	42.8	1,248	46.5	4,411
Refillable Glass Bottle (2)	32.0	3,733	42.2	5,398
HDPE Bottle (3)	40.0	763	58.0	3,336

(1) End-of-life for this system is modeled with 80% going to a landfill and 20% combusted at a WTE facility.

(2) End-of-life for this system is modeled with a 90% reuse rate (8 trips) with 15% recovered for recycling, 68% going to a landfill, and 17% combusted at a WTE facility. However, the energy recovery is only available for the cap/seal.

(3) End-of-life for this system is modeled with 29% recovered for recycling, 57% going to a landfill, and 14% combusted at a WTE facility.

Source: Franklin Associates, a Division of ERG calculations using original data from LCI/LCA by NatureWorks, LLC and Franklin Associates.

Wal-Mart Scorecard Milk Bottles--summary



FreeDigitalPhotos.net

- No good way to estimate reusable glass bottle
 - Unrealistically assuming no transport burden it appears best by 25% over HDPE
- HDPE 27% better score than paper carton
- PLA bottle last-note scorecard data needs to be updated

Package Modeling

Wal-Mart Stores, Inc. Package Modeling

Modeling your package allows you to experiment with different materials to see how they can improve your score as well as help the environment.

Package & Model Properties

Metric	Package Score	My Metrics
Greenhouse Gas Emissions from Package Production	0.00000079	0.00000000
Sustainable Material	0.0002750	0.00102338
Average Distance to Transport Material	0.00069361	0.00124274
Package to Product Ratio	0.00063264	0.00124274
Cube Utilization	0.533	0.250
Recycled Content	0.00006150	0.00015158
Recovery	0.00117354	0.00276495
Renewable Energy to Power Each Facility	0	0
Innovation Different from Energy Standard	0	0
Weighted Score:	19.8990	1.0000

Equivalents

Scorecard Questions

Background & Product Info.

What is the consumer meaningful unit of measure (CMU)? 20 Ounce

Selling Unit Packaging materials

What is the percentage of cube utilization? 741

How many selling unit packaging materials are used? 2 Material(s)

What is the total weight per package for this material? 13.3 grams

How far did this material travel before packaging occurred? Under 500 Miles or Under 804 kilometers

What is the second packaging material? Recycled Folding Board

What is the total weight per package for this material? 130 grams

How far did this material travel before packaging occurred? Under 500 Miles or Under 804 kilometers

Transport Packaging Materials

Is this item a break pack? Yes No

What is the percentage of cube utilization? 1

How many materials are used to transport the selling unit package? 2 Material(s)

What is the shipping solution for this package? Landed Flat (ie. One-way, odd-size, etc.)

Life Cycle Inventory Coffee Packaging



TOTAL ENERGY, TOTAL SOLID WASTE, AND GREENHOUSE GASES FOR 100,000 OUNCES OF GROUND COFFEE

	Total Energy	Total Solid Waste		Greenhouse Gases
	(MM Btu)	(lb)	(cu ft)	(lb of CO2 equivalents)
Coffee Packaging Systems				
15-oz. Fiberboard and Steel Canister (1)	23.4	1,376	48.0	2,376
26-oz. Fiberboard and Steel Canister (1)	22.3	1,311	45.5	2,169
11.5-oz. Steel Can (2)	25.8	1,757	67.8	4,377
34.5-oz. Steel Can (2)	18.9	1,379	51.5	3,140
11.5-oz. Plastic Canister (3)	42.6	1,142	70.7	3,310
34.5-oz. Plastic Canister (3)	33.4	896	55.7	2,606
12-oz. Laminate Bag	13.0	504	14.8	1,358
13-oz. Brick Pack	10.2	384	11.1	1051

(1) End-of-life for the fiberboard/steel canisters are modeled as 80% being landfilled and 20% combusted with energy recovery. The steel sections of the canister are collected at the waste-to-energy plants and sent to recycling.

(2) End-of-life for the steel cans are modeled as 62% being recycled and 38% going to a landfill. The plastic labels on these cans are assumed to be incinerated during the steel recycling, but the energy created during this incineration is used internally in the steel recycling.

(3) End-of-life for the HDPE canisters are modeled as 15.4% being recycled, 16.9% going to combustion with energy recovery, and 67.7% going to a landfill. The plastic labels are assumed to be recycled with the plastic canister.

Note: The end-of-life for all other packaging is modeled as 80% going to a landfill and 20% combusted with energy recovery.

Source: Franklin Associates, a Division of ERG calculations using the Franklin Associates database and the U.S. LCI Database.

Wal-Mart Scorecard Coffee-summary



- 13 oz. Plastic composite brick pack
 - improved 7 of 9 metrics
 - 12% better than 12 oz laminate
 - 75% better than 11.5oz steel can
- 12 oz. laminate second
- 34.5 oz plastic canister third

Package Modeling

Wal-Mart Stores, Inc. Package Modeling

1.3.04

Wal-Mart Stores Inc. Package Modeling
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- (1.6250) Flexible Pouch 10 oz.
- (1.6250) Barrier Tray 8 oz.
- (2.2500) Rigid with Inner Pouch 10 oz.
- (5.5000) Bacon 1 lb.
- (3.5000) Cereal Flexible Bag 21 oz.
- Cereal Bag in Box 20 oz.

Package & Model Properties

Package & Model Scores

Metric	Wal-Mart Metrics	My Metrics
	Package Score	Model Score
Greenhouse Gas Emissions from Package Production	0.00000079	0.00000060
Sustainable Material	0.0002750	0.0152338
Average Distance to Transport Material	0.00063061	0.00124724
Package to Product Ratio	0.00063061	0.00124724
Cube Utilization	0.533	0.259
Recycled Content	0.00006159	0.00015158
Recovery	0.00117354	0.00276495
Renewable Energy to Power Each Facility	0	0
Innovation Different from Energy Standard	0	0
Weighted Score:	19.0000	1.0000

Equivalents

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What is the second packaging material? Recycled Folding Board

What is the total weight per package for this material? 130 grams

How far did this material travel before packaging occurred? Under 500 Miles or Under 804 kilometers

Transport Packaging Materials

Is this item a break pack? Yes No

What is the percentage of cube utilization? 1

How many materials are used to transport the selling unit package? 2 Material(s)

What is the shipping solution for this package? Landed Use Pallet (ie. One-way, odd-size, etc.)

Thus, studies show the use of plastics can help:

- minimize raw material consumption,
- minimize energy use,
- reduce greenhouse gas production,
- And minimize waste to landfill
- Improve scorecard results



Input for this presentation was provided by:

Charlene Wall, BASF Corporation

Jeff Wooster, Dow Chemical Company

Amanda Holder, Berry Plastics

Dennis Sabourin, National Association for PET Container Resources

Frank Onorato, Sabert Corporation

Gerhard Guenther, Total Petrochemicals, USA

Mark Spencer, Pactiv Corporation

Bruce Bitowft, ROPAK Packaging

Read: For More Information

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

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