



# Sustainable Packaging Trends

Gwen Lorio     April 28, 2011



# Surprising number of new terms



CARBON DISCLOSURE PROJECT



Carbon Offsets  
Carbon Neutral  
LCA=Life Cycle Analysis  
GPP=Global Packaging Project



**CSR= Corporate Social Responsibility**  
**NGO=NonGovernment Organization**  
**ERP=Extended Producer Responsibility**  
**Product Stewardship**  
**RIC=Resin Identification Code**



RPPC, Bag Bills and ERP  
Biodegradable vs. Compostable  
Biobased vs. Recyclable  
Municipal Solid Waste  
Recycled Content



Cube utilization  
CMUM=Consumer meaningful unit of measure  
GHG=Green House Gas  
FTC Green Guides  
Scorecards and Claims



**Cradle to Cradle**  
**Cradle to Gate**  
**Recycle**  
**Down-cycle**



# Agenda

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Clorox Sustainability

Sustainable Packaging Supply Chain

Trend 1 – Fiber Certification

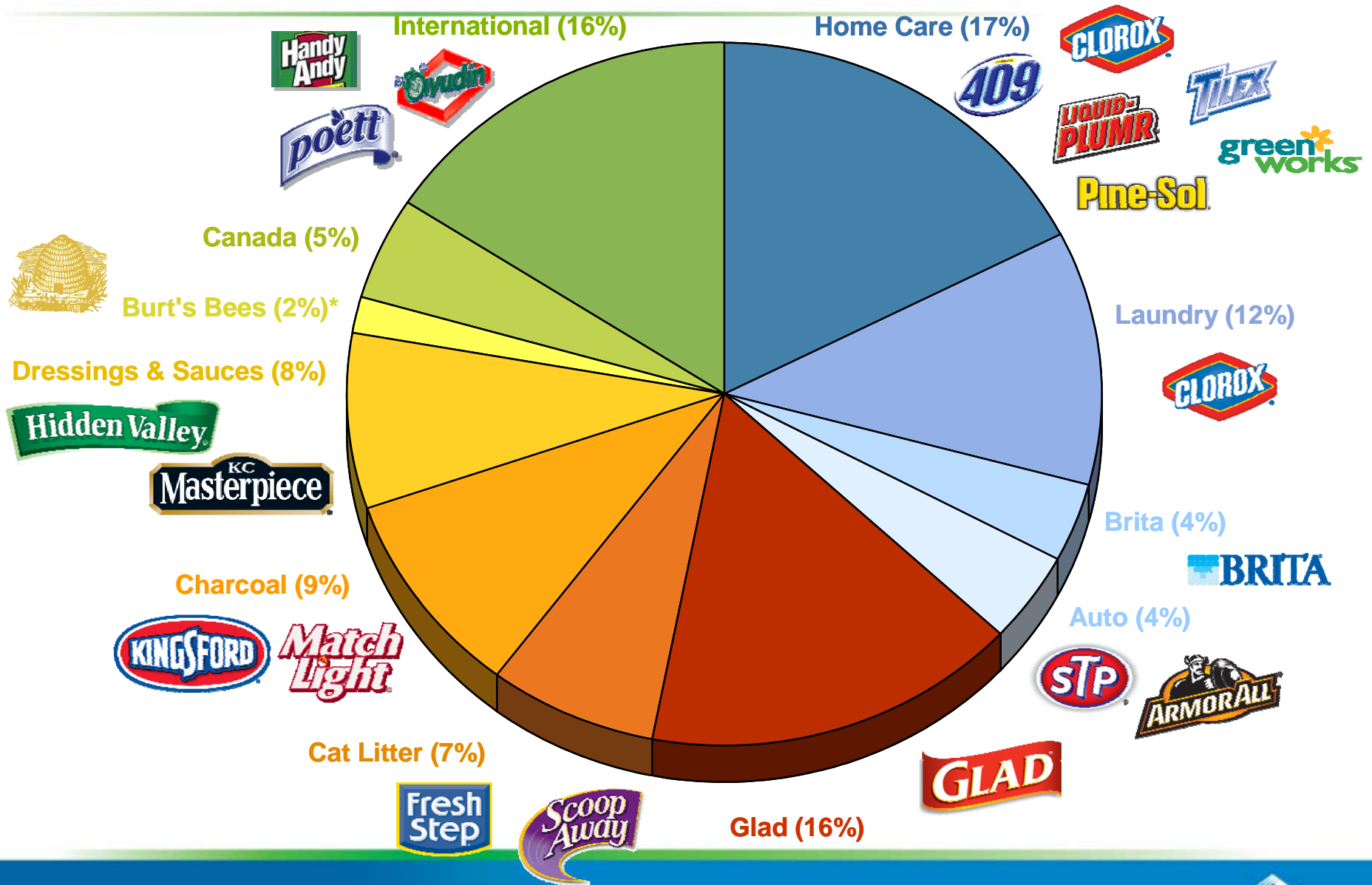
Trend 2 – Renewable Polymers

Trend 3 – Compostable Packaging

Trend 4 – Labeling for recovery

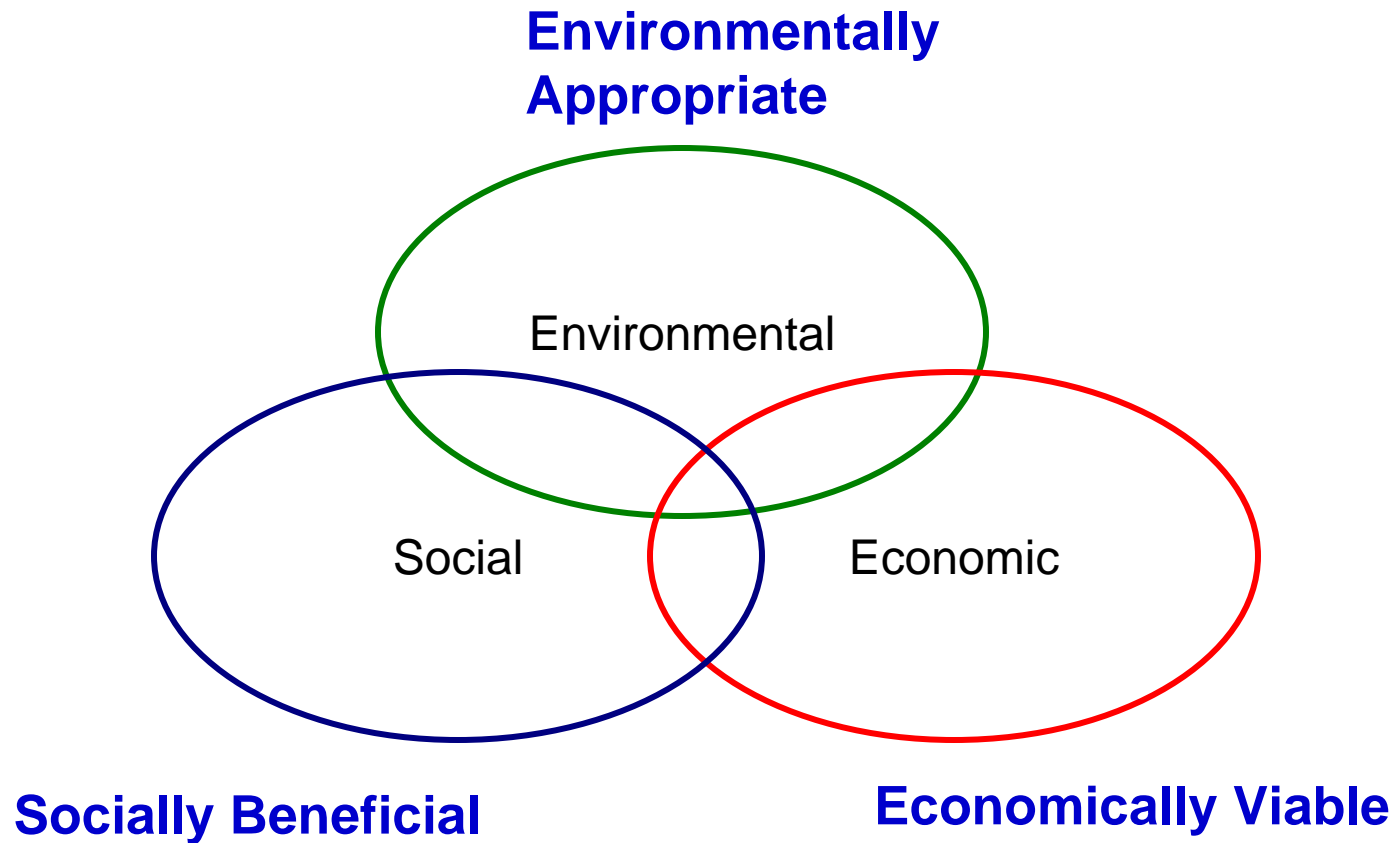
Trend 5 – Tools to measure Sustainable Packaging

# Clorox 2010 Sales of ~ \$5 Billion



Sustainability includes 3 parts

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## Clorox's 2013 Sustainable Packaging Goals:

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- Reduce packaging of the majority of our product portfolio by 5 percent or more
- Have more than 90 percent of all our products in recyclable primary packaging
- Increase PCR content in our primary and secondary packaging
- Eliminate PVC in all packaging

## Examples - Packaging reduction:



Converting Cat Litter plastic pails to Bags

## Recyclable Package:



Move Brita blister pack to carton

## Increase PCR content:



Increase PCR content in  
LC2 bottles to 35%

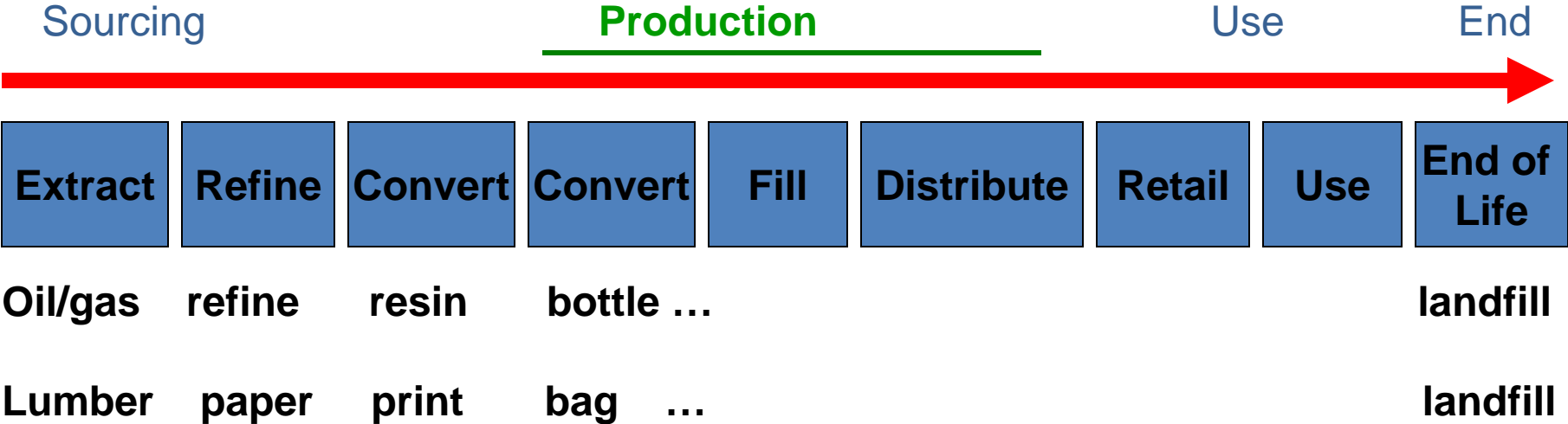
## Eliminate PVC Packaging:



Eliminate PVC in  
shrink bands and sleeves

# Traditional Supply Chain

Linear approach



# Traditional Packaging Sustainability:

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- ✓ Lightweight packaging
- ✓ Incorporate recycled content
- ✓ Improve Cube for Transportation Efficiency
- ✓ Concentrating products
- ✓ Improve quality to minimize waste

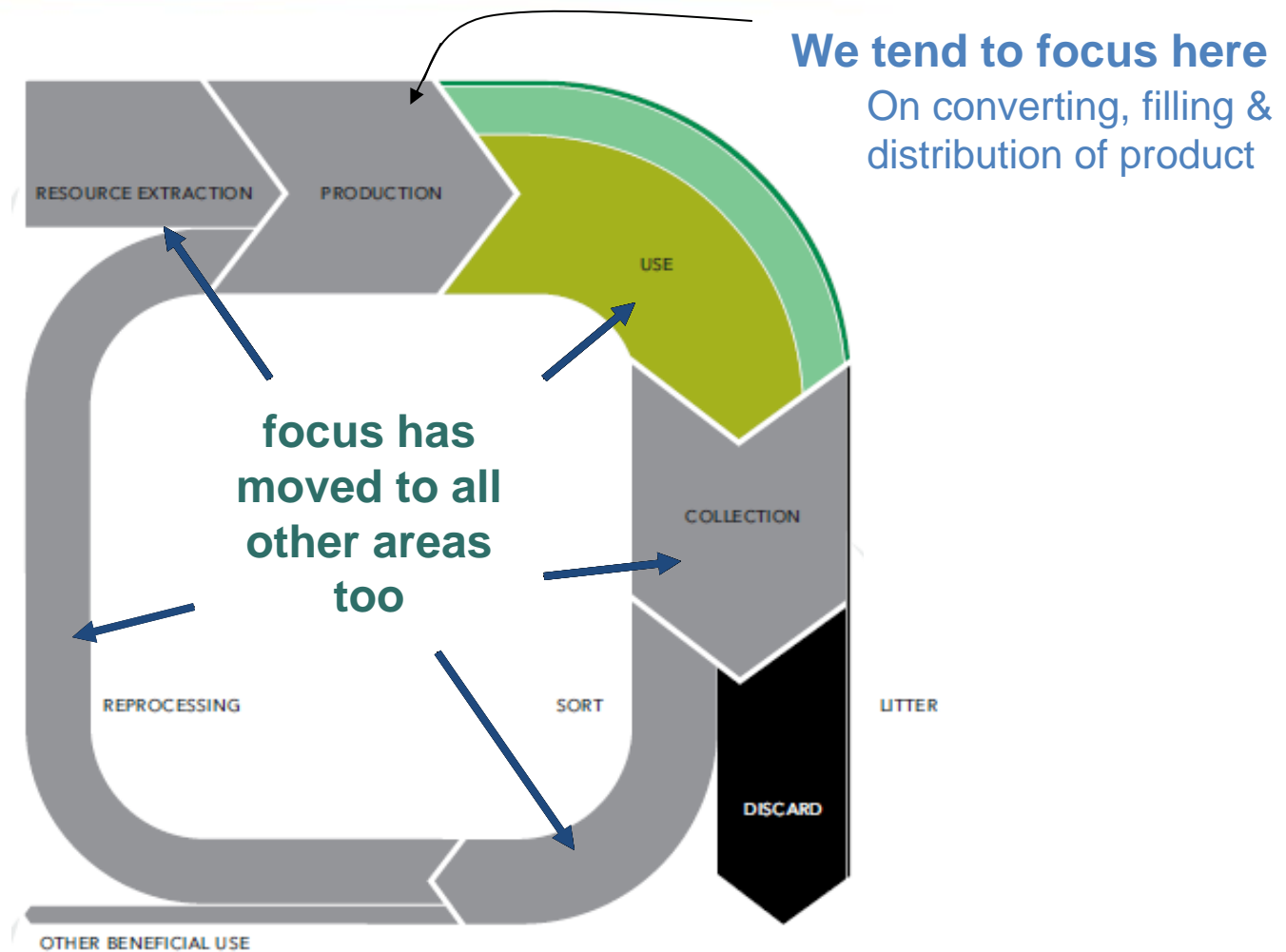
# SPC Sustainable Packaging Definition:

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- 1) Is beneficial, safe & healthy for individuals and communities **throughout its life cycle**.
- 2) Meets market criteria for performance and cost.
- 3) Is sourced, manufactured, transported and recycled using **renewable energy**.
- 4) Maximizes the use of **renewable** or recycled source materials.
- 5) Is manufactured using **clean production technologies** and best practices.
- 6) Is made from materials healthy in all probable **end-of-life scenarios**.
- 7) Is physically designed to optimize materials and **energy**.
- 8) Is effectively recovered and utilized in biological and/or industrial **closed loop cycles**.

Sustainable Packaging Coalition <http://www.sustainablepackaging.org/>

# SPC's Material Flows Diagram



We tend to focus here  
On converting, filling &  
distribution of product

focus has  
moved to all  
other areas  
too

# SPC's Material Flows Diagram



# Trend 1: Forestry/Fiber Certifications



# Fiber Certifications

ATFS	CSA	FSC	PEFC	SFI
American Tree Farm System	Canadian Standards Association	Forest Stewardship Council	Programme for Endorsement of Forest Certification Schemes	Sustainable Forestry Initiative
<a href="http://www.treefarmssystem.org">www.treefarmssystem.org</a>	<a href="http://www.csasfmforest.ca">www.csasfmforest.ca</a>	<a href="http://www.fsc.org">www.fsc.org</a>	<a href="http://www.pefc.org">www.pefc.org</a>	<a href="http://www.sfiprogram.org">www.sfiprogram.org</a>
<a href="http://www.forestfoundation.org">www.forestfoundation.org</a>		<a href="http://www.fscus.org">www.fscus.org</a>		
tree farmers	Canadian only	environmental & social NGO's, individuals, forest industry, academic	34 member countries	environmental, professional, academic groups, loggers, forest industry, public officials, labor
Chain of custody requirements	Chain of custody requirements	Chain of custody requirements	Chain of custody requirements	Chain of custody requirements
Annual Audit	Annual Audit	Annual Audit	Annual Audit	Annual Audit
5 year recertification	5 year recertification	5 year recertification	5 year recertification	5 year recertification



[http://thepaperlifecycle.org/forests/in\\_depth/forest-certification-matrix](http://thepaperlifecycle.org/forests/in_depth/forest-certification-matrix)

# Trend 2: Renewable Polymers

## Renewable polymer:

- made by or derived from a biological source (renewable), usually agricultural. (a.k.a. Bio-Polymer or Bio based)
- Can be produced again and again; will not be depleted if managed properly,
- May have reduced net emissions of CO<sub>2</sub> across their life cycle vs. materials from fossil fuels
- *May or may not be biodegradable or recyclable*

## Biodegradable Polymer

- will decompose within a reasonably short time after customary disposal, into CH<sub>4</sub>, CO<sub>2</sub>, H<sub>2</sub>O, and biomass/organic compounds.
- Polymers that can be attacked by micro organisms.

## Compostable Polymer

- A polymer that biodegrades safely, leaving no visible or toxic residues, with the resulting compost supporting plant growth. (meets ASTM D 6400-04)
- Must degrade to CO<sub>2</sub> in municipal composting facilities at a rate comparable to yard trimmings and food scraps.

# Renewable Materials

PET – PlantBottle Coke	30% from Sugar Cane	Coke/Desani & Heinz Ketchup bottles
PETa Klockner Pentaplast	30% from Sugar Cane	TerraPET for flexible & thermoformed Pkgs
HDPE Braskem	100% from Sugar Cane	Pantene & Odwalla bottles
PLA Cargill NatureWorks	100% from Corn	Frito Lay SunChips & Stoneyfield Farms Yogurt
Mirel ADM Metabolix		Parker Pen Housings & Degradable Plant Pots
Starch		Glad Compostable Trash Bags



# SPC's Material Flows Diagram



# Unsustainable Packaging: must “Close the Loop”



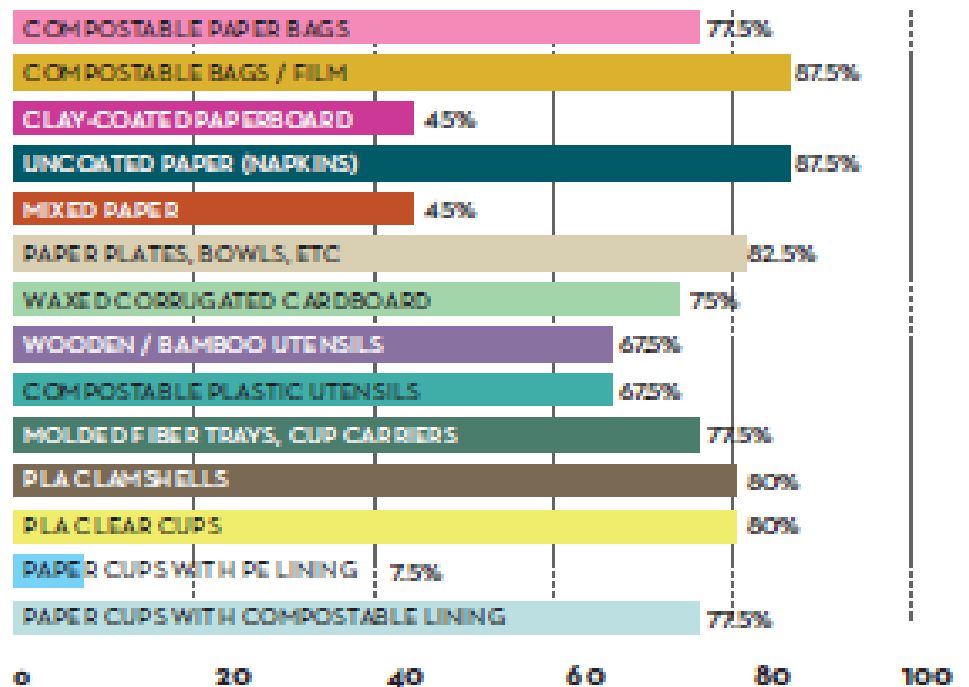
## Trend 3: Compostable Packaging

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- Why compost packaging?
  - Encourages diversion of food/organics from landfill
  - In turn, reduces methane emissions
- Recycling offers higher value for items without food contamination
  - Key take away:  
Don't design compostability into non-food packaging

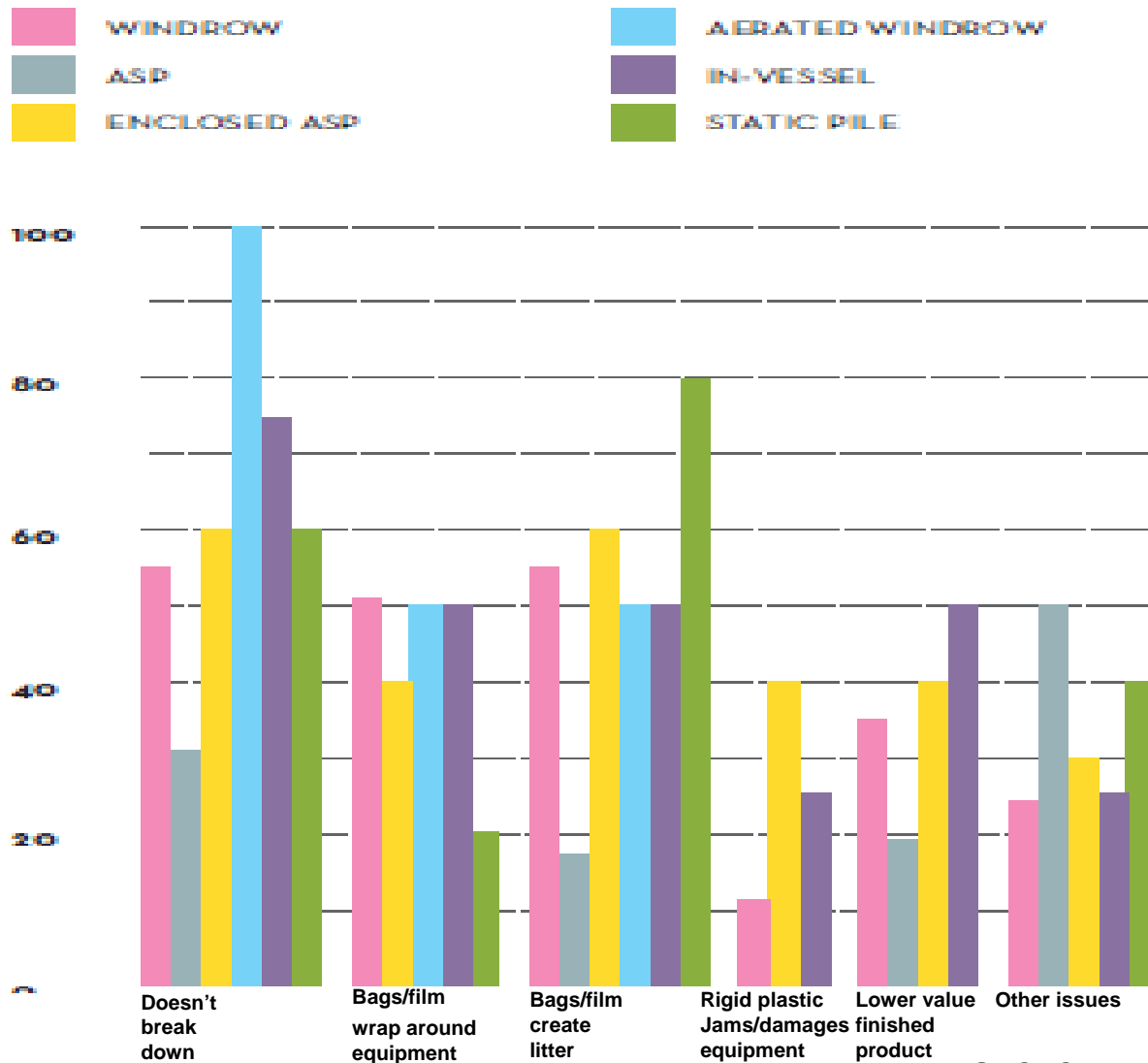
# What packages do composters accept?

- ✓ Uncoated paper bags (take out bags, grocery bags, etc.)
- ✓ Uncoated paper (napkins, tissue, etc.)
- ✓ Clay coated paperboard (e.g. cereal boxes)
- ✓ Mixed paper (e.g. old mail, paperboard, cardboard, etc.)
- ✓ Paper plates, bowls, trays
- ✓ Paper cups w/ PE lining
- ✓ Paper cups with compostable biopolymer lining
- ✓ Molded fiber/pulp (wood, bagasse, palm, etc) cup carriers, trays, plates
- ✓ Waxed corrugated cardboard
- ✓ Wooden/bamboo utensils
- ✓ Compostable plastic utensils
- ✓ Compostable plastic bags/film
- ✓ PLA clamshells, clear cups



Per SPC: Compostable Packaging, 2010 report

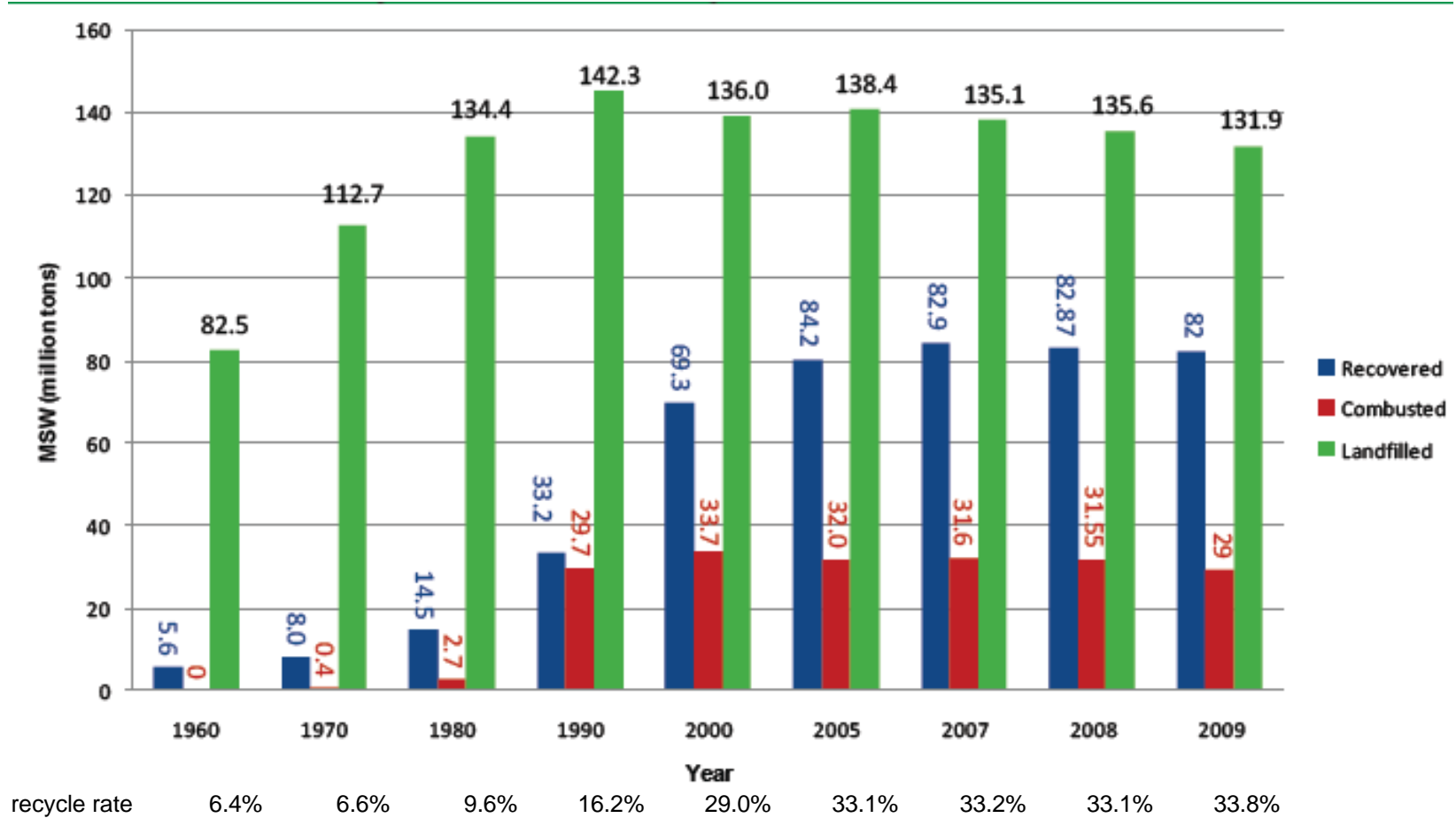
# Problems with packaging at Composters



SPC: Compostable Packaging Report, 2010

# Trend 4: Labeling for Recovery

## US Municipal Solid Waste (MSW)



# Consumer Confusion



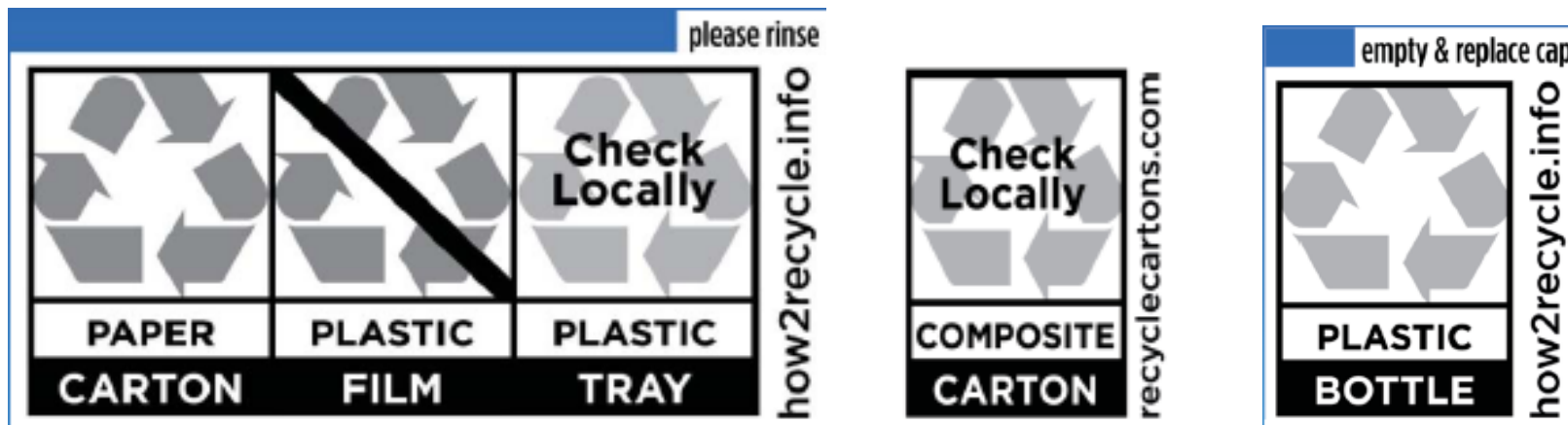
# Labeling for Recovery

## SPC's recommendation for labeling system

Enables consumers to recycle using easy to understand labeling.

Improves the reliability and transparency of recycling claims.

Under review with FTC for Green Guides compliance



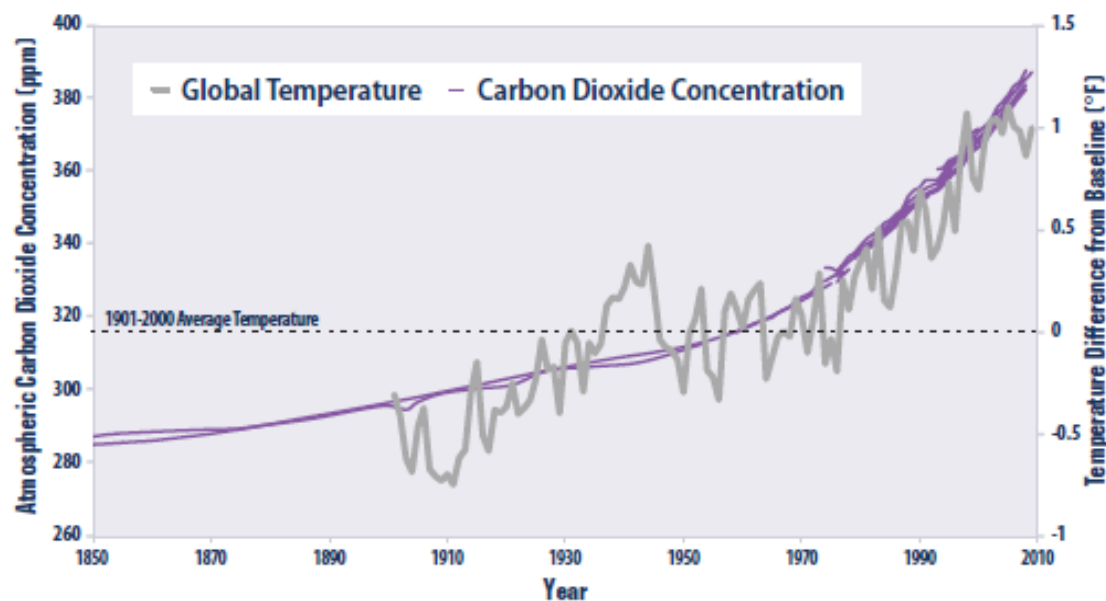
## Trend 5: Tools to measure Sustainable Packaging

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- LCA (Life Cycle Assessment)
- Compass
- WalMart Packaging Scorecard

# Why GHG Emission Tracking is important:

## The Link Between Greenhouse Gases and Temperature, 1850-2009



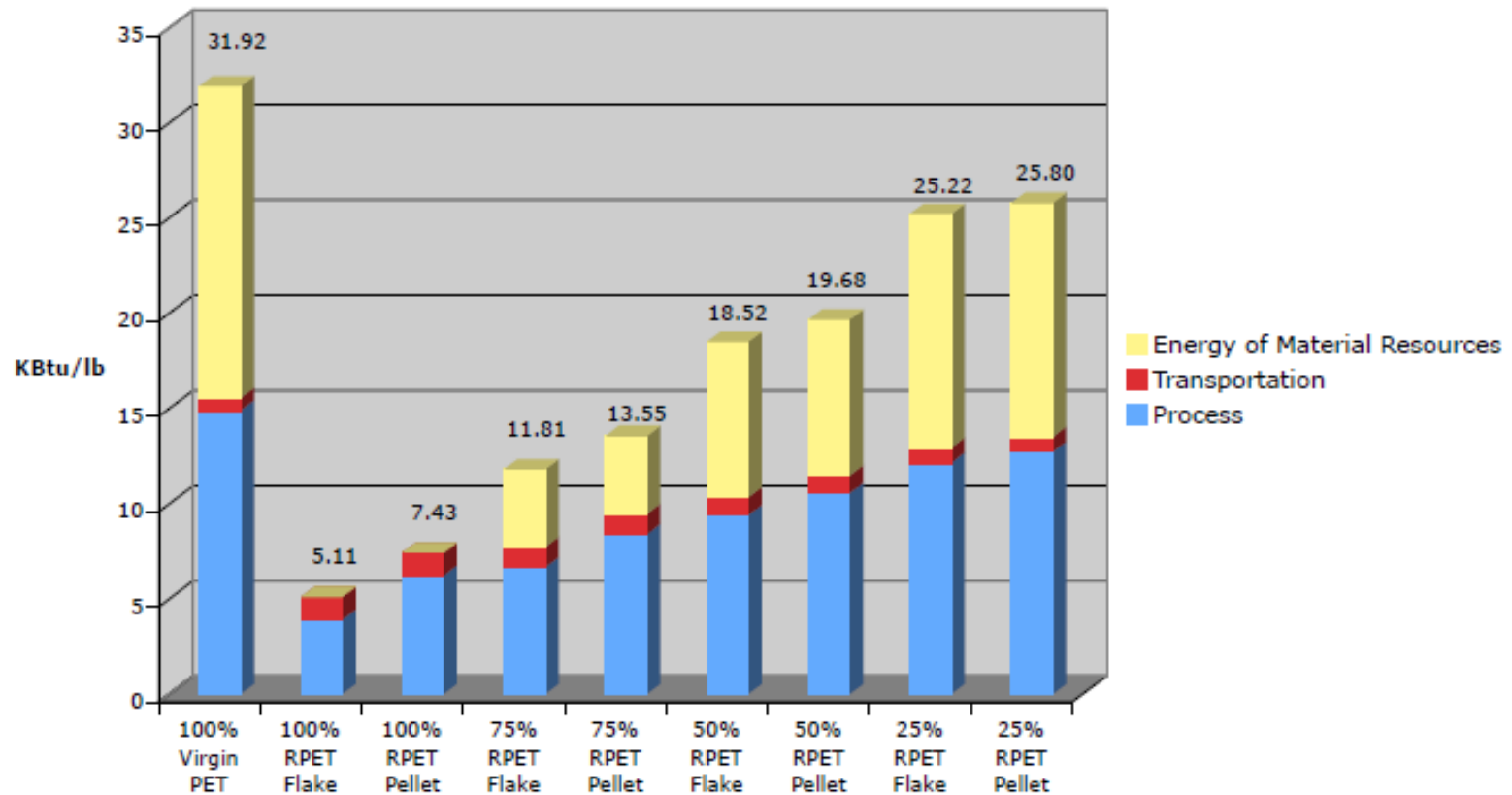
Source: Carbon Dioxide Information Analysis Center. 2010. <http://cdiac.ornl.gov/> and National Oceanic and Atmospheric Administration. 2010. [www.noaa.gov](http://www.noaa.gov)

*Emissions of carbon dioxide, an important greenhouse gas, have been increasing since the Industrial Revolution. These emissions are causing carbon dioxide levels to build up in the atmosphere and global temperatures to rise. In particular, temperatures have gone up at an increased rate over the past 30 years. Carbon dioxide data in this figure are compiled from several different studies. Temperature data show the difference from the average or baseline temperature between 1901 and 2000.*



# LCI data describes materials by energy/GHG

Comparison Virgin PET to Varying Levels of Recycled PET: Energy



**Sources:**

Final LCI for RPET and RHDPE - April 7, 2010 - GWP for Methane is 25, for N2O is 298, PER IPCC 2007

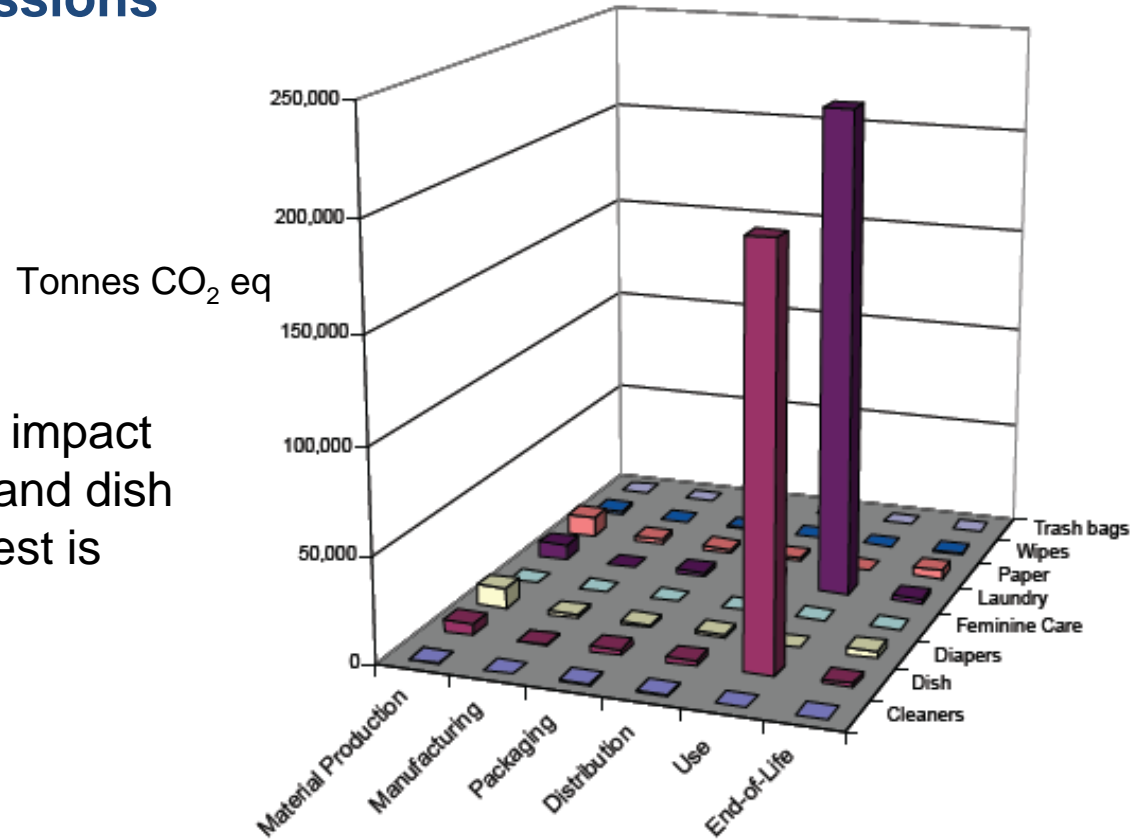
RPET data is based on volume based collection with 50% compaction and the cut off recycling allocation methodology.

**Note:** Comparisons between different polymers need to be on the basis of a common package not by the burden per pound as shown here.

# GHG Emissions:

## Seventh Generation Products GHG emissions

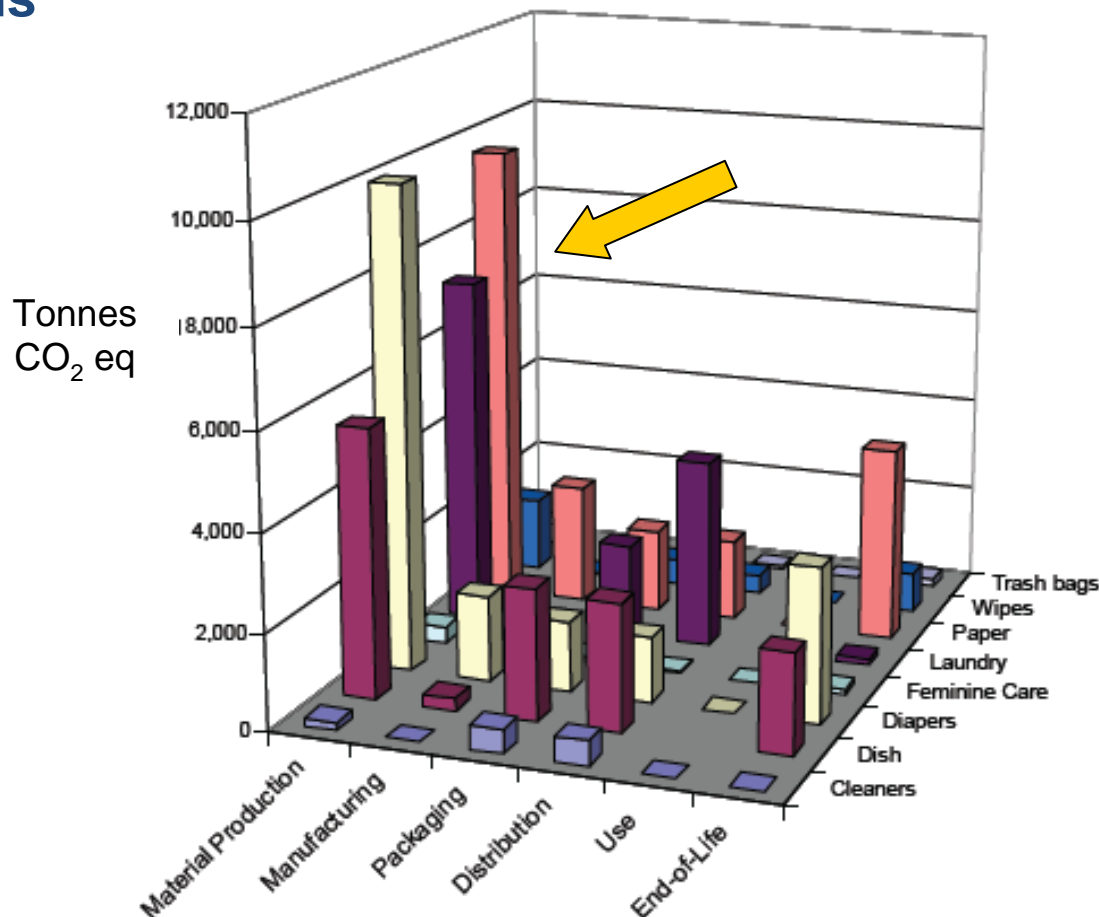
The use phase energy impact is so large for laundry and dish soap (hot water), the rest is minimized.



# GHG Emissions from Product

## Seventh Generation Products GHG emissions

Without the use phase shown, its clear that the largest impacts come from Material Production.



# GHG emissions: Apple



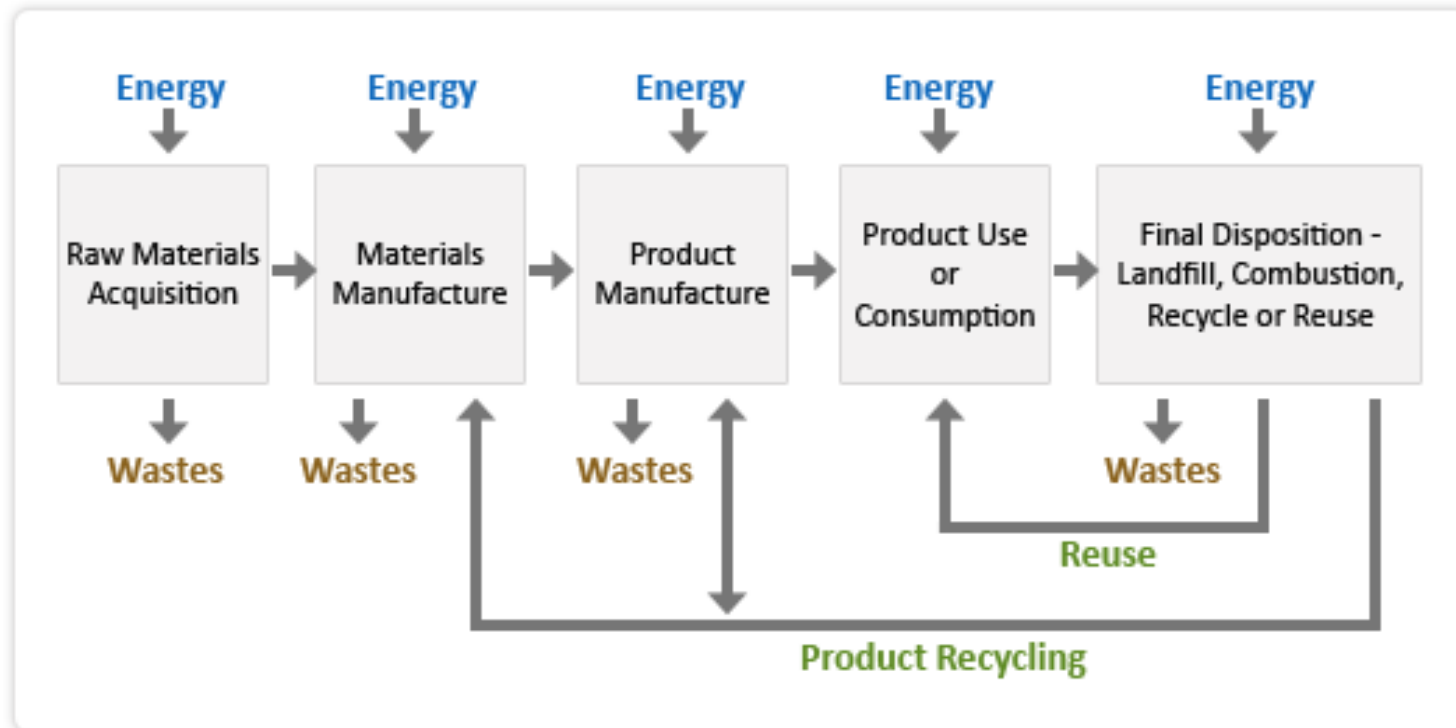
In a product's life cycle, how big an impact is packaging and transportation?

- Production, 56%
- Customer use, 35%
- **Transport, 8%**
- Recycling, <1%
- Total greenhouse gas emissions: 530 kg CO<sub>2</sub>

*Source: [www.apple.com/environment/reports](http://www.apple.com/environment/reports). Results apply to 15-inch MacBook Pro.*

# Tools to measure sustainability: LCA

LCA: cradle to grave assessment of package - energy, GHG emissions, air and water toxicity, & solid waste



**Waste= Air emissions + Water emissions + Solid wastes**

# Tools: LCA

**Table 2-5**

**Greenhouse Gas Summary for the Production of HDPE Resin**  
(lb carbon dioxide equivalents per 1,000 lb HDPE or kg carbon dioxide equivalents per 1,000 kg HDPE)

	<u>Fuel-related CO2 Equiv.</u>	<u>Process CO2 Equiv.</u>	<u>Total CO2 Equiv.</u>
Carbon dioxide (fossil)	1,377	76.9	1,454
Methane	107	323	430
Nitrous oxide	6.06	0	6.06
Methyl bromide	1.9E-08	0	1.9E-08
Methyl chloride	2.1E-07	0	2.1E-07
Trichloroethane	4.4E-07	4.1E-06	4.6E-06
Chloroform	4.3E-08	0	4.3E-08
Methylene chloride	3.4E-04	0	3.4E-04
Carbon tetrachloride	0.0016	5.1E-06	0.0016
CFC-012	3.4E-05	0	3.4E-05
HCFC-22	0	0.0018	0.0018
<b>Total</b>	<u>1,490</u>	<u>400</u>	<u>1,890</u>

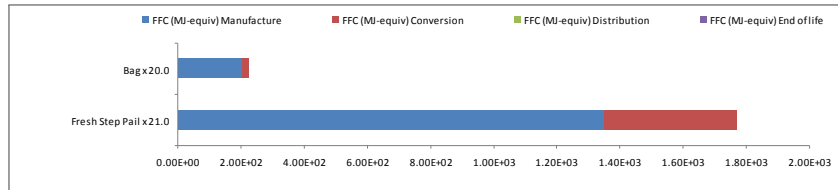
Note: The 100 year global warming potentials used in this table are as follows: fossil carbon dioxide--1, methane--25, nitrous oxide--298, methyl bromide--5, methyl chloride--16, trichloroethane--140, chloroform--30, methylene chloride--10, carbon tetrachloride--1400, CFC-012--10,900, HCFC-22--1810, HCFC-123--77, and HFC-134a--1430.

Cradle to Gate Life Cycle Inventory of 9 Plastic Resins... Franklin Associates, July 2010

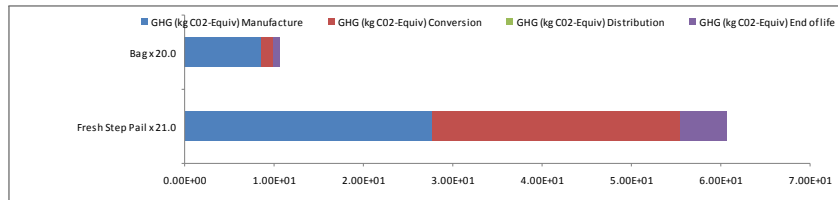
# Tools: Compass



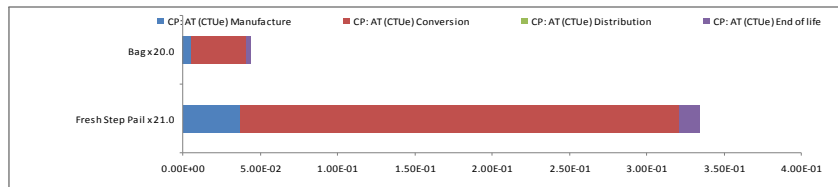
## Fossil Fuel Consumption (MJ-equiv)



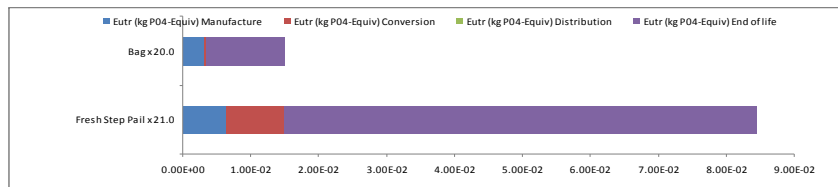
## GHG Emission (kg CO2-Equiv)



## CP: Aquatic Toxicity (CTUe)



## Eutrophication (kg P04-Equiv)



### Life Cycle Metrics CONSUMPTION METRICS

#### Fossil Fuel

- Water
- Mineral
- Biotic Resource

### Packaging Attributes

- Recycled vs. Virgin Content
- Percent of Source Certified Material
- Solid Waste
- Material Health

### Emission Metrics

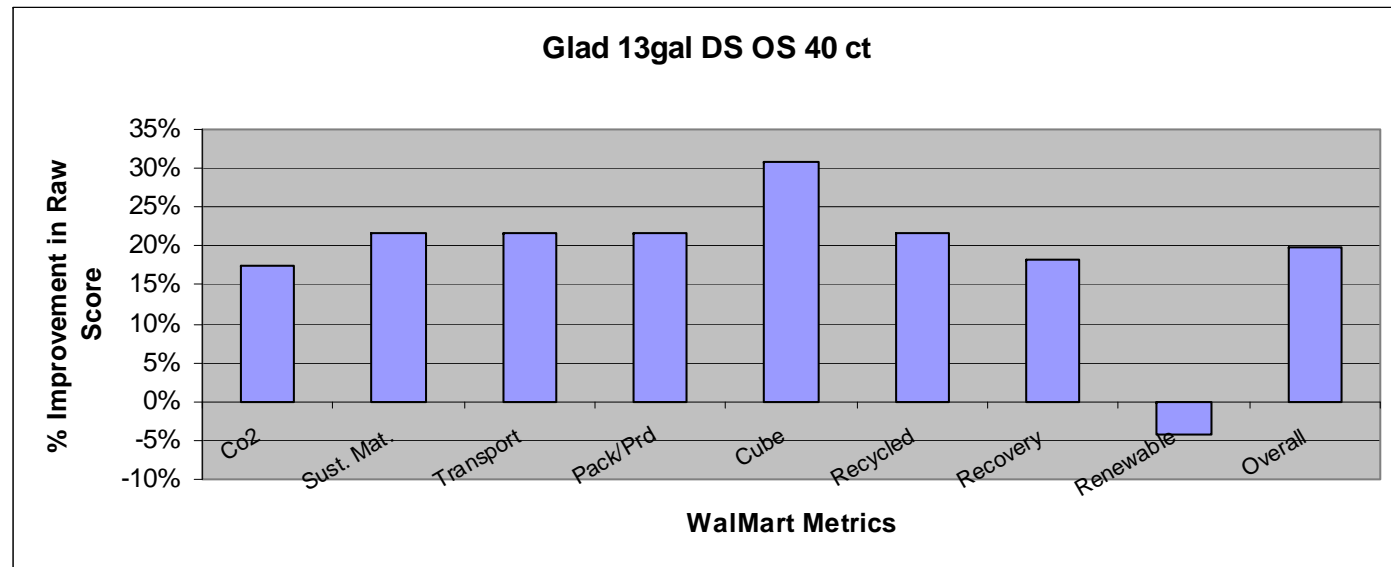
- Greenhouse Gas
- Clean Production: Human Impacts
- Clean Production: Aquatic Toxicity
- Eutrophication

### Life Cycle Phases

- Material Manufacture
- Conversion
- Distribution
- End of Life

# Tools: WMT Packaging Scorecard

9 metrics – GHG, material, cube, package/product, renewable energy, transportation, recycled content, recovery



Product Description	Product SKU	Co2	Sust. Mat.	Transport	Pack/Prd	Cube	Recycled	Recovery	Renewable	
GLAD curent	1258760932	0.00000013	0.00021435	0.0002144	0.0002144	0.84412	0.000132	0.0003369	0.552438	5
GLAD New	1258778362	0.00000011	0.00016782	0.0001678	0.0001678	0.58367	0.000104	0.0002756	0.575339	5

# Resources

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Sustainable Packaging Coalition: <http://www.sustainablepackaging.org>

FTC Green Guides: [http://www.ftc.gov/bcp/edu/microsites/energy/about\\_guides.shtml](http://www.ftc.gov/bcp/edu/microsites/energy/about_guides.shtml)

Product Stewardship Institute: <http://productstewardship.us/index.cfm>

US EPA: <http://www.epa.gov/climatechange/index.html>

ACC: <http://www.americanchemistry.com>

Ameripen: <http://ameripen.org/>

Euopen: <http://www.euopen.be/>

Forest Stewardship Council: <http://www.fsc.org/>

Sustainable Forestry Initiative: <http://www.sfiprogram.org/>

NOAA: [www.esrl.noaa.gov/research/themes/carbon/](http://www.esrl.noaa.gov/research/themes/carbon/)

Ca State Food & Agriculture [www.cdffa.ca.gov/.../Climate\\_Change.html](http://www.cdffa.ca.gov/.../Climate_Change.html)

Greener Package <http://www.greenerpackage.com/>

## Questions?