LCA Sustainable Product Design Conference
Miami, FL – Wednesday 27 October 2010

C.2 – Reducing Your Packaging Waste Throughout the Life Cycle and Supply Chain Through Product Design

www.wspenvironmental.com/usa
Session Outcomes

- Determining the cost and environmental impact of packaging throughout the supply chain and life cycle
- Comparing different forms of packaging and analyzing the impact on the triple bottom line (social, economic and environmental cost)
- Learning how to encourage key stakeholders to reduce packaging impacts
- Practical examples where companies have designed packaging to reduce the waste of their packaging cost effectively
Agenda

- Context
- Commercial Drivers
- Reporting & Communications
- Value Chain
- Approach
- Design – Case Studies
- Materials – Case Studies
- Light Weighting – Case Studies
- Software Tools
- Challenges
- Q & A / Discussion
- About WSP
Context - Packaging Requirements

- Advertising & Consumer Information
- Product Protection
- Retail Security
- Logistics / Distribution
- Cost
**Context – Fast Facts**

- Packaging industry worldwide > $465 billion business
- Americans sent 246 million tons of trash to landfills and incinerators in 2005
- Individual waste generation in the United States is approximately 4.5 pounds per person, per day
- 1/3 of all consumer trash in the United States comes from packaging
- 2.4 million pieces of plastic enter the world's oceans every hour

http://walmartstores.com/Sustainability
Context – Commercial Benefits of Packaging Design

- Reduce Cost
  - Shipping
  - Spoiled /Damaged Product
  - Packaging Materials
  - Supply Chain Efficiencies

- Reduce Environmental Impacts
  - Extended Shelf Life
  - Supply Chain Efficiencies

- Market Innovation
  - Differentiation
  - Brand Building

- Market Access

- Mitigating Supply Chain Risk / Disruption
Commercial Drivers

- Regulations
  - FTC Guidelines
- Private Sector
  - Walmart, Tesco, M&S
- Consumers
- Competitors
  - Innovation, design, brand
Regulation – FTC Green Guides

- Use of Environmental Marketing Claims
- Green packaging claims
- Biodegradable, compostable, recyclable

Federal Trade Commission
Protecting America's Consumers

Private Sector

- Largest private employer in US
  - Worlds largest public company by revenue $300 BILLION in goods
  - + 6,200 facilities around the world
  - VOLUME

- **25 February 2010** - Eliminate 20 million tons of greenhouse gas emissions from **life cycle of products** by 2015; representing 1.5 X carbon growth over the next five years

- Packaging Scorecard
  - Reduce packaging by 5 percent globally by 2013 (2008 Baseline)
  - Be packaging neutral globally by 2025
  - Eliminate PVC from private brand packaging in the U.S. by October 2007
    - significant progress; not eliminate PVC from certain items until another material of equal performance is developed
Impact of changes by 2013, based upon a 5% packaging reduction in supply chain are:
- 667,000 metric tons of CO2 not emitted into the atmosphere (Wal-Mart U.S. only)
- 213,000 trucks off the road annually (Wal-Mart U.S. only)
- 66.7 million gallons of diesel fuel saved (Wal-Mart U.S. only)
Consumers

Primary drivers are defined by consumer demand and private sector initiatives
Reporting & Communications

1. Product Certification
   • EPD
   • ISO 14025

2. WRI Pilot Programs - Product Footprint
   • June 2010

3. Walmart / Tesco / M&S / TSC
   • Sustainable Supply Chain Initiatives

4. Carbon Labels
Consumer Packaging Value Chain

Life Cycle of Ball's Packaging

Ball Corporation

Material Suppliers

Brand Owners

Raw Materials

Distribution/Warehousing

Retailers

Consumers

Energy Recovery

Landfill

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Approach

- Process & Product Design
  - Smarter by Design
  - Material Substitution
  - Light-weighting
  - Packaging Alternatives
  - DfE

- Communications & Environmental Claims
  - ISO 14025
  - Carbon Labeling

- Supply Chain and Logistic Efficiencies
Approach – Reduce, Reuse, Recycle

- **Remove**: Eliminate unnecessary packaging, boxes or layers, and harmful materials.
- **Reduce**: “Right-size” packages, optimize material strength, and design packages appropriately for contents and merchandising requirements.
- **Reuse**: transport packaging, improved pallets, and reusable plastic containers (RPCs).
- **Renew (able)**: Use materials made of renewable resources as measured using ASTM D6866, or select biodegradable materials that meet ASTM D6400 or ASTM D6868.
- **Recycle (able)**: Use materials made of the highest recycled content without compromising quality, including post-consumer recycled material (PCR) where appropriate. Components should be chosen based on recycle-ability post-use, with a goal of increasing the municipal recycling rates.
- **Revenue**: Achieve all principles at cost parity or cost savings, which requires a supply chain approach.
Packaging Design for Environment (DfE)

**Purpose**
- Useful
- Simple (less Complex)
- Out of the Box

**Process**
- Reduce Weight & Size
- Simplify Material Variety
- Design Packaging in Parallel

**USE**
- Durability
- Upgradability
- Closed Loop

**EOL**
- Modular
- Avoid ‘Extras’
- Simplify (minimize fasteners)
Design Hierarchy

Raw Materials → Processing → Manufacture → Logistics → Consumer Use → EOL

$ incorporated into product price

 Reduce →  
 Reuse →  
 Recycle →  

Material Selection  
Technology Innovation  
Light Weighting  
Education, Behavior  
Industrial Ecology  

WSP Environment & Energy
the designer’s field guide to sustainability

This is a working document
We’d love you to submit your version to us, so we can update and improve this document in version 3.0.

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http://www.lunar.com/fieldguide/tips.html
Design - Is Packaging Necessary?

Replacing traditional distribution of DVD/CD disk kit software with electronic software distribution (ESD) can result in a 91% reduction in carbon emissions.

Design - Dell

- **Cube** — How big is the box? Could it be smaller?
  - Shrinking the packaging for the Dell Inspiron 1318 by 50% through redesign
- **Content** — What is the packaging made of? Could it be made of something better?
- **Curb** — Is it easily recycled?

- **Three goals:**
  - reduce desktop and laptop packaging materials by 10% worldwide
  - increase sustainable content in cushioning and corrugate packaging by 40%
  - ensure that 75% of packaging components are curbside recyclable.
Design – Innovation - Boise Paper

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Design - Eco Efficiency - Method
Design - Innovation - Replenish

Three Reasons to Use Replenish

CLEANS EVERYWHERE  SAVES MONEY  PLANET FRIENDLY

FLIP SQUEEZE CONCENTRATE  MIX ADD WATER  CLEAN A LITTLE SMARTER
## Material Selection

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>EOL</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>PET</td>
<td>Petroleum</td>
<td>Highly recyclable</td>
<td>Durable</td>
</tr>
<tr>
<td>PLA</td>
<td>Cellulosic-based</td>
<td>Compostable</td>
<td>Sustainable, Innovation</td>
</tr>
<tr>
<td>PC/ABS</td>
<td>Plastic Blend</td>
<td>NOT recyclable</td>
<td>Common Material</td>
</tr>
<tr>
<td>Steel</td>
<td>Mineral Extraction</td>
<td>Most recycled material</td>
<td>Durable</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Mineral Extraction</td>
<td>Highly recycled</td>
<td>Light weight</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Bio-based</td>
<td>Compostable</td>
<td>Durable</td>
</tr>
<tr>
<td>HDPE</td>
<td>Petroleum</td>
<td>Recyclable</td>
<td>Common Materials; Durable</td>
</tr>
</tbody>
</table>
Material Selection

- Retail & Distribution: 7%
- Use: 3%
- End of Life: 2%
- Raw Material Extraction & Pre-processing: 46%
- Production: 43%

Carbon Footprint of a 50cl Aluminum Can (16.9 oz)*

- Metals production: 71.2% (incl. credits for recycling)
- Can manufacturing: 24.3%
- Distribution & chilling: 0.4%
- Remelting: 4.1%

Source: PE International, European Aluminum Association
Materials - PLA

The Coca-Cola Company

Stonyfield Organic

Odwalla

plantbottle™
up to 30% plant-based 100% recyclable bottle
redesigned plastic, recyclable as ever.

Our multipack cups are now made from plants
The Life Cycle of Bioplastics

Some bioplastics decompose in a fairly short period of time, and the full life cycle of such products is shown here. Other bioplastics aren’t biodegradable. But even in those cases, the use of plant-based raw materials means that pollution is being removed from the atmosphere while the plants grow, giving bioplastics a green appeal.

Manufacturing
Bioplastics manufacturers use pellets or granules of the compounds to make utensils, plates, cup linings, carpeting and other products.

Sources: CTC Clean Tech Consulting GmbH; WSJ reporting

http://online.wsj.com/article/SB10001424052748703989304575504141785646492.html
PLA - Challenges

- Sustainable Sourcing
- Some limitations in use / functionality
- EOL Consumer Education → Compost
Light Weighting - Nestle Water North America

- 30% less plastic than average
- Save 65 million lbs PET resin & 10 million lbs of paper annually
Light Weighting – Glass / Metal

- **Glass** WRAP – Waste & Resources Action Plan
  - Saving 11,000 tons of *glass* through light weighting
  - 28,300 metric tonnes CO2

- **Aluminum** cans as most recycled and most recyclable beverage container
  - 105,784 cans are recycled every minute in the US
  - Recycled aluminum can returned to a store shelf as a new can in as few as 60 days
  - Recycling aluminum saves 95 % of energy used to make cans from virgin ore.

- **Steel** recycling rate > 63%, with the industry re-melting more than 18 billion cans into new products
  - All steel products contain a minimum of 22% recycled content
  - Steel industry saves enough energy in one year to electrically power 18 million homes for one year.
Software Tools

PackageSmart

PIQET

ECRM

rediPoint

Product Ecology

ENVIRONMENTAL PACKAGING INTERNATIONAL
Specialists in global environmental packaging and product stewardship requirements

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Challenges

Cost
- Primary Interest to customer
- Design for Use

Culture
- Perception
- Acceptance of Performance
- Customer / Consumer adoption

EOL
- Recyclability
- Industrial Symbiosis
About WSP
WSP is the leading global supplier of environmental, energy, and management consultancy services.

http://www.wspenvironmental.com

2009 Revenue
US$127.3 M

Projects in
60 Countries
Our Clients

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ORACLE®
genzyme
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First Environment
L.L.Bean
Pacific Gas and Electric Company®

Gap Inc.
Kimberly-Clark Corporation
SUN microsystems
Sun
Estée Lauder
ROCHE

Climate Change Capital

United Technologies
Goldman Sachs
Diageo
Deutsche Bank
Boise

Autodesk
Coors
Marks & Spencer

Google
Apple
HP
EMC

Ball
Shaklee
Intel
IBM

Microsoft

Boeing

First Environment

Nvidia

Turner

WSP Environment & Energy

WSP
Climate Change Business Journal

Business Achievement Awards 2009

Project Merit: Carbon Footprinting
Organizational Innovation: Internal Carbon Trading

CCBJ Weekly News
Thank You

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