Comparative Packaging Assessment

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BizNGO webinar - 12 April 2013
agenda

• Intro
• Background
• COMPASS model
• Data
• Streamlined LCA
• Material health
• Discussion / Q&A
leveraging the design process
the whole system perspective
implications of design choices

MARKET SIGNALS
- demand for certification
- reduced energy intensity
- reduced impacts

DISTRIBUTION
- transport efficiency
- product loss

RETAIL
- on shelf appeal
- shelf life
- safety

WASTE DISCARD
- effective recovery
- reduce disposal

CONSUMER
- product appeal
- safety
- satisfaction

BRANDS
- image
- perception

SUSTAINABLE PACKAGING COALITION®
A PROJECT OF GREENBLUE®
the model
a design-phase web application that provides comparative environmental profiles of packaging alternatives based on life cycle assessment metrics and attributes
build scenarios using components

SIMPLE COMPONENTS

COMPOSITE COMPONENTS
packaging system

PRIMARY PACKAGE + SECONDARY PACKAGE → PACKAGING SYSTEM
multi-pack scenario

COMPONENT A \( \times 6 \)
- Bottle
- Label
- Cap

COMPONENT B \( \times 1 \)
- Carry case

COMPONENT A \( \times 6 \)
- Can

COMPONENT B \( \times 1 \)
- six-pack rings
refill scenario

APPLICATIONS: liquid soap, cosmetics, wipes and cleansers, etc.

Waste Reduction Model
The entire package is reused and is refilled from another package (forms and capacity can vary).

Extended Life Model
A critical component(s) is reused while the reset of the components are discarded and replaced with a refill package.

Refill scenarios requiring washing or industrial cleaning are excluded.
account for distribution legs

<table>
<thead>
<tr>
<th>MODE</th>
<th>VEHICLE</th>
<th>DISTANCE: km and m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>relevant trucks to the region</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>freight train</td>
<td></td>
</tr>
<tr>
<td>Sea</td>
<td>barge and transoceanic freight ship</td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>cargo plane</td>
<td></td>
</tr>
</tbody>
</table>

**FUEL:** diesel, gasoline, kerosene, other as available

**DATA:** USLCI and ecoinvent
life cycle coverage in COMPASS
transport model (being developed)

Add distribution related transport for components, packages and shipping the system to the DC
DATA
data

• Consistent background data modeling for common packaging materials and processes
• Apples to apples comparisons based on common functional unit
• Region specific solid waste profiles for US, CA, EU
• Verified by industry and external reviewers
data sets

• Data sets for U.S., Canada, Europe
  – Background data from ecoinvent and USLCI
• End of Life (EoL) treatments for packaging
  – Landfill, WtE, compost, incineration, litter
• EoL solid waste profile
  – Regional recover and discard information from USEPA, EuroStat, StewardEdge Canada
materials and processes

• Polymers
  – HDPE, LDPE, LLDPE, PET, PP, PS, EPS, PVC, PVDC, PLA, EVA, Nylon 6, PC, Modified starch (Mater-bi)
  – PU, SAN, ABS
• Fibers
  – Solid Bleached and unbleached Sulfate Board (SBS and SUS), Recycled Folding Boxboard, Corrugated, Supercalendered Paper, Bleached and Unbleached Kraft Paper, Liquid Packaging Board
  – Jute, Kenaff, Cotton (coming soon)
• Metals
  – Steel, stainless steel and aluminum
• Container glass

• Polymers
  – Blow molding
  – Extrusion, plastic film
  – Foaming, expanding
  – Injection molding
  – Stretch blow molding
  – Thermoforming, with calendaring
• Fibers
  – Production of paper bags
  – Production of carton
  – Production of corrugated boxes
  – Cutting
  – Weaving (coming soon)
• Metals
  – Sheet rolling
  – Production of steel can
informed prototyping
comparative packaging assessment
COMPASS® (comparative packaging assessment)

component level assessment during the concept and prototype stages to optimize the system
component in relation to package

**Primary Package Overview:**

**SOAP IN A PUMP DISPENSER + REFILL POUCH**

**Name:** Soap in a Pump dispenser + refill pouch

**Description:** Primary package: PET bottle and pump assembly, composite pouch with 4x volume. Compared to five units of the pump dispenser.

**Total Capacity:** 1,250 ml

**Data Set:** US

**Component Contribution:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Fossil Fuel Consumption (MJ-eq)</th>
<th>Water Consumption (l)</th>
<th>Biotic Resource Consumption (m2)</th>
<th>Mineral Consumption (kg)</th>
<th>GHG Emission (kg CO2-Equiv)</th>
<th>CP1 Human Impacts (Total) (DALYs)</th>
<th>CP2 Aquatic Toxicity (CTUE)</th>
<th>Eutrophication (kg P04-Equiv)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Component Details**

<table>
<thead>
<tr>
<th>Name</th>
<th>Material and Conversion</th>
<th>% PCR</th>
<th>% CERT</th>
<th>Distribution Legs</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle</td>
<td>50.0 g of Polyethylene Terephthalate (PET) converted using Injection Molding</td>
<td>0.0</td>
<td>0.0</td>
<td>(None Yet)</td>
<td>(None Yet)</td>
</tr>
<tr>
<td>Cap</td>
<td>7.0 g of Polystyrene (PS) converted using Injection Molding</td>
<td>0.0</td>
<td>0.0</td>
<td>(None Yet)</td>
<td>(None Yet)</td>
</tr>
<tr>
<td>Pouch</td>
<td>Composite (total weight: 32.5 grams)</td>
<td>0.0</td>
<td>0.0</td>
<td>(None Yet)</td>
<td>2</td>
</tr>
<tr>
<td>Pump assembly</td>
<td>Composite (total weight: 10.0 grams)</td>
<td>3.5</td>
<td>0.0</td>
<td>(None Yet)</td>
<td>4</td>
</tr>
</tbody>
</table>

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package to package comparison

**Life Cycle Metrics**

- **Functional Unit of Comparison:**
  - 1250 ML
- **Metrics Compared:**
  - Fossil Fuel Consumption (MJ-equiv)
  - GHG Emission (kg CO2-Equiv)
  - Water Consumption (l)
  - CP: Human Impacts (Total) (DALYs)
  - Biotic Resource Consumption (m3)
  - CP: Aquatic Toxicity (CTUe)
  - Mineral Consumption (kg)
  - Eutrophication (kg P04-Equiv)

**Charts Displayed:**

- **Fossil Fuel Consumption (MJ-equiv):**
  - Bar chart showing consumption values.
- **GHG Emission (kg CO2-Equiv):**
  - Bar chart showing emission values.
- **Water Consumption (l):**
  - Bar chart showing consumption values.
- **CP: Human Impacts (Total) (DALYs):**
  - Bar chart showing impact values.
- **Biotic Resource Consumption (m3):**
  - Bar chart showing consumption values.
- **CP: Aquatic Toxicity (CTUe):**
  - Bar chart showing toxicity values.
- **Mineral Consumption (kg):**
  - Bar chart showing consumption values.
- **Eutrophication (kg P04-Equiv):**
  - Bar chart showing eutrophication values.
attributes and material health
material health
A business to business online registry that provides sustainability information about materials used in a variety of product and industrial sectors.
Material profiles for product intelligence


Tools for Transparency

Profiles in Sustainability

Vestibulum erat wisi


Nike

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vestibulum tortor quam.
TUB 121 Polyethylene Copolymer

INEOS Olefins & Polymers USA


Continuous Improvement Index

Benchmark 1 Chemicals

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS #</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene-Hexene-1 Copolymer (pure)</td>
<td>25213-02-9</td>
<td>25.00%</td>
</tr>
<tr>
<td>Carbon Black</td>
<td>1333-86-4</td>
<td>4.00%</td>
</tr>
<tr>
<td>Proprietary #2</td>
<td></td>
<td>1.00%</td>
</tr>
<tr>
<td>Anti-oxidant</td>
<td></td>
<td>1.00%</td>
</tr>
</tbody>
</table>

Ecolabels

<table>
<thead>
<tr>
<th>Standards</th>
<th>Ecolabels</th>
<th>Banned/Restricted Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED</td>
<td>BIFMA</td>
<td>RoHS, REACH, ECOLLOGO</td>
</tr>
<tr>
<td></td>
<td>ECOLOGO</td>
<td>NIREC MATERIAL INNOVATION INDEX, NIKE SUS INDEX</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GOOGLE RED LIST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>REGULATORY</td>
</tr>
</tbody>
</table>
material health summary view
material health detailed view
next generation tools

• COMPASS + ArtiosCAD
  – Combine rapid virtual prototyping with environmental profile based on BOM
  – Baseline and track environmental changes performance over

• COMPASS + CAPE
  – Combine cube and vehicle load optimization with environmental implications associated with assets deployed
  – Investigate alternate solutions with expanded analytical data

• COMPASS + MIQ
  – Combine LCA with hazard screens for materials to allow a holistic view
  – Develop a lower cost entry into risk assessment for product development
discussion

• Limitations
  – Current and representative life cycle inventory (LCI)
  – Data transparency and uncertainty
  – Methodologies

• Drivers
  – Retailer and corporate scorecards
  – Global Packaging Protocol for Sustainability (GPPS)
  – The Sustainability Consortium (TSC)
  – GS1 Global Data Standard

• Opportunities
  – Measurements ≠ Sustainability
  – Use LCA to improve environmental performance of package and product, DfE and/or DfR, not for making claims
  – Informing public policy
Thank you!

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