Analyzing the Value Proposition for Sustainable Packaging Materials

Susan Homan
Marketing Manager – Sustainable Materials
DuPont Packaging & Industrial Polymers
Agenda

What are the primary driving forces for sustainability in packaging?

Short-term and longer-term directions towards sustainability

Renewable materials - How much is enough?

A look into the future of sustainable materials
Mega Trends Offer Growth Opportunities

• Unprecedented growth in developing countries
• Need for increased food production
• Drive for renewable energy and materials
• Demand for greater safety and security
• Desire for increased connectivity
Oil prices are on the rise
Influencing Drivers Vary by Region
Impact on Packaging

- Recycled Content
- Biodegradable
- Reuse
- Sustainable Packaging
- Renewable Content
- Recyclable
- Compostable
Product Launches with Environmental Claims

Mintel, 2007
Packaging Sustainability

Consumers are exposed to sustainability on a variety of levels

- Claims vary by manufacture, country, product and package
- Claims are visual and consumers must seek out the information to locate

Countries with retailer environmental mandates have seen the most influx of environmentally friendly packaging claims

Claims made on these packages vary from environmentally friendly to recyclable to made with XX% post consumer material

- Claims may be valid but country infrastructures may not support
Recycled Content and Recyclable

100% PCR Polypropylene Container

100% Recyclable Cardboard and liner
Reduce / Reuse

18% reduction in materials

Reducing food waste with single-serve ambient packaging

1-step process saves 50% energy and also reduces material
Biodegradable and Compostable

Renewably-sourced and biodegradable thermoplastic starch

Renewably-sourced and biodegradable flexible package
Renewable Content

100% renewably-sourced package – carton, film, and label

Single-material lipstick tube made from PLA
Renewable Materials - an important environmental concern to businesses

Top 3 Box Importance in Business Decisions

<table>
<thead>
<tr>
<th>Category</th>
<th>Current</th>
<th>5 years from now</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Efficient</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Recyclable</td>
<td>64</td>
<td>66</td>
</tr>
<tr>
<td>Renewable Materials</td>
<td>61</td>
<td>63</td>
</tr>
<tr>
<td>Biodegradable</td>
<td>60</td>
<td>61</td>
</tr>
<tr>
<td>Natural/Organic</td>
<td>54</td>
<td>55</td>
</tr>
<tr>
<td>Bio-Based</td>
<td>46</td>
<td>50</td>
</tr>
</tbody>
</table>

% indicating “very important” (8, 9 or 10)

BASE Total Respondents = 806

DuPont market research Fall, 2006
Business Response to importance of renewable materials

- Cleaner and reduced environmental impact or footprint
- Stable price and supply
- Enhanced performance products made from renewable materials
- Government preferred product
- Enhanced favorable public relations / opinion of companies using renewable materials in their products

DuPont market research Fall, 2006
Familiarity with Renewables

Top 3 Box Familiarity with Renewable Materials

% indicating “very familiar” (8, 9 or 10)

- Total: 43%
- US: 53%
- Germany: 32%
- Japan: 19%
- China: 60%
- Brazil: 67%
- Sweden: 20%

n = (806) (205) (146) (118) (139) (103) (95)

DuPont market research Fall, 2006
Driving stronger interest with Familiarity

Comparing Top 3 Box Familiarity With and Interest in Using Renewable Materials

DuPont market research Fall, 2006
Consumer Response

65% of consumers are willing to pay more in order to have a renewable alternative

35% of consumers would choose a renewable option to reduce dependence on oil imports

DuPont market research Fall, 2006
Renewably Sourced™ Materials

1. Renewable Content
   - An ingredient obtained from sustainable agricultural sources
   - Minimum of 20% renewable content by weight.
   - Verified by ASTM carbon dating
   - Renewable content & environmental impact data is disclosed

2. Parity-Plus Performance
   - Meets or exceeds the analogous petroleum-derived product in critical performance dimensions

www.renewable.dupont.com
Current Renewable Materials

“New” Resins

- PLA
- PHA
- PTT (w/ bio-PDO)
- TPS

Blends with Petro-based

- Starch with Polypropylene and others
- Fibers with Polymers

Modifiers for new Bio-based Resins

- Impact Modifiers for PLA
- Thermal modification of PLA
The Future

Traditional Polymers using renewable feedstocks

- Ethylene / Polyethylene from monomer derived from sugar cane
- Polyamides
- Higher bio-content renewables

Higher-functioning renewables

Cellulosic feedstocks

More emphasis on sustainable processes… as well as materials
Thank-you!

Susan E. Homan
Marketing Manager – Sustainable Materials
DuPont Packaging & Industrial Polymers
susan.homan@usa.dupont.com
302-992-2147

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