HIGH BARRIER PLA FILMS
FOR FLEXIBLE PACKAGING
OUTLINE

• Sustainable Packaging: Industry Drivers
• Options for the Converter
• PLA Films
• High Barrier PLA Films
• Conclusions
Sustainable Packaging: Industry Drivers
Where in the chain is the push for sustainable packaging coming from?
INDUSTRY DRIVERS

Where in the chain is the push for sustainable packaging coming from?

Raw Material Suppliers

Film Suppliers

Converters

Consumer Product Groups

Retailers

Composting Facilities

Consumers

Only 17% of consumers are green motivated

Just trying to keep up with demand

Presented by: Dante Ferrari
Celplast Metallized Products
AIMCAL Fall Technical Conference, Oct. 7-10 2007
INDUSTRY DRIVERs

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INDUSTRY DRIVERS

Where in the chain is the push for sustainable packaging coming from?

- Raw Material Suppliers
  - NatureWorks – PLA
  - Metabolix – PHA
  - Cereplast – Compounds
  - Novamont, Biotech, etc. - Starches

- Film Suppliers
  - Film suppliers & converters providing information and assisting CPG’s in development

- Converters
  - Newman’s Own Organics
  - Green Mountain Coffee
  - “An Inconvenient Truth” DVD

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Converters

Consumer Product Groups
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Retailers
- Tesco – carbon labelling
- Marks & Spencer – reduce CO₂
- Wal-Mart – Sustainability 360

Consumers
- Only 17% of consumers are green motivated

Composting Facilities
- Just trying to keep up with demand

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DON'T FORGET THE GOVERNMENT

- Domestic security of supply – fewer supply chain risks
- The US does not want to be at the mercy of global oil markets
Options for the Converter
OPTIONS FOR THE CONVERTER

1. Buy into the movement
2. Adapt
3. Reduce package weight
4. Go biodegradable
5. Go biodegradable *and* renewable

Increasing Difficulty
OPTIONS FOR THE CONVERTER

1. Buy into the movement

• Sealed Air purchases a majority interest in Biosphere Industries, LLC, a California based manufacturer of sustainable rigid packaging materials.

2. Adapt

• PLA film wrapper from Bosch: The new Stratus horizontal wrapper, equipped with the SK-100 shrink tunnel, can now be used with Earth First PLA film from Plastic Suppliers.
OPTIONS FOR THE CONVERTER

3. Reduce package weight
   • Cost driver as well as environmental driver
   • Already a major part of most converters’ strategies to provide lower cost, higher value solutions to Brand Owners

4. Go biodegradable
   • Oxo-biodegradable plastic additives retain most of the original film properties, but are activated by bacteria in landfills: plastic breaks up into microscopic particles and “disappear”
   • Dupont’s Biomax PET resins offer versatile properties, but can be easily hydrolyzed and biodegrade
OPTIONS FOR THE CONVERTER

5. Go biodegradable and renewable

• Design structures with PLA films
• Design structures with other substrates:
  • Paper
  • Cellophane (regenerated cellulose)
  • Films made from new resins and compounds
PLA Films
PLA FILMS

Benefits:

• Processes similar to PET film

• Availability - two film manufacturers in North America, several globally

• High clarity

• Good deadfold
PLA FILMS

Benefits:

- Heat seals to itself – good bond strength
- Made from a renewable resource – corn
- Compostable
  - Meets ASTM D6400 standard in North America
  - Meets EN 13432 standard in Europe
  - Meets GreenPLA certification in Japan
PLA FILMS

Two key issues still need to be addressed:

• Poor barrier properties

• Low temperature resistance
PLA FILMS

WVTR (g/100 in2/day) @ 100 F, 90%RH

OTR (cc/100 in2/day) @ 74 F, 50%RH

Food Packaging
Barrier Requirements

- MAP, confectionary
- Liquid packaging
- Cheese, cured meats
- Dry breads, cereals, snack foods
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High Barrier PLA Films
HIGH BARRIER PLA FILMS

Solution #1: Clear Barrier

• SiOx-coated PLA film

• Food packaging type barrier properties

• High clarity, colourless

• SiOx nanolayer represents <0.1% of film structure, so metallized PLA is still compliant with international compostability requirements
HIGH BARRIER PLA FILMS

Solution #1: Clear Barrier

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Solution #1: Clear Barrier

One week shelf life test in MAP

PLA without SiOx coating

PLA with SiOx coating
HIGH BARRIER PLA FILMS

Solution #2: High Barrier Metallizing

• Nanolayer of high barrier aluminum on PLA film

• Meets the needs of a broader range of food packaging applications

• Bright, metallic look

• Metal nanolayer represents <0.1% of film structure, so metallized PLA is still compliant with international compostability requirements
HIGH BARRIER PLA FILMS

Solution #2: High Barrier Metallizing

- WVTR (g/100 in2/day) @ 100 F, 90%RH
- OTR (cc/100 in2/day) @ 74 F, 50%RH

- 100 g PLA (Plastic Suppliers)
- 100 g metallized PLA
- 100 g metallized PLA laminate

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Solution #2: High Barrier Metallizing

- WVTR (g/100 in²/day) @ 74 F, 90%RH
- OTR (cc/100 in²/day) @ 74 F, 50%RH

- 80 g PLA (Plastic Suppliers)
- 80 g metallized PLA
- 80 g metallized PLA laminate
Conclusions
CONCLUSIONS

• Sustainable packaging currently being driven by large retailers, particularly Wal-Mart in the US

• Flexible packaging converters are beginning to feel the pull from Brand Owners to improve their Packaging Scorecard scores

• Several options available to converters today: the most potentially rewarding (and most difficult) is to go biodegradable and renewable
CONCLUSIONS

• A lot of investment in new biodegradable materials made from renewable resources, but options are very limited today

• PLA film is the front-runner of these new biodegradable materials, but barrier properties limit its potential use in food packaging applications

• New nanolayer inorganic coatings allow converters to meet the barrier needs of most food packaging applications, using either clear or metallized PLA films
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