

Sustainability Times

Sustainable Efforts

‘Sustainable’ packaging means tradeoffs

Everyone loves sustainable packaging. How could anyone not embrace it? It would be like being against apple pie or motherhood. The problem is, there’s little understanding, even among packaging professionals, about what sustainable is. Some emphasize material from renewable sources like corn or wood; others favor recyclable materials; still others advocate recycled content. It makes it really tough to design the most sustainable package.

“The fact is there are rarely clear-cut winners,” says Patricia Enneking, director of Global Sustainability and Environmental Affairs at Klöckner Pentaplast Group, Gordonsville, VA, a maker of polyvinyl chloride (PVC) and other types of film and sheet used in packaging. For example, “Biodegradable materials in a landfill are of questionable value because landfills are designed so their contents don’t biodegrade,” says Enneking.

A lightweight package may have an advantage over a heavier package with a higher recycling rate. In the 2007 Packaging Efficiency Study, published by the ULS Report, Rochester, MI, a comparison of coffee packaging shows cans account for more waste in landfills than bags/pouches even though cans are recycled at a higher rate.

In a 2006 study by Athena Institute International, Kutztown, PA, which compared 16-ounce cold drink cups made of high-impact polystyrene, polyethylene terephthalate (PET), polypropylene and polylactide (a biopolymer derived from corn), the polypropylene cup scored the lowest in weight, energy consumption, solid waste generation and greenhouse gas emissions.

A comparison by Plastics Europe, Brussels, Belgium, of clamshells made of PVC, amorphous PET and PET glycol shows PVC ranks lowest in oil and energy consumption and greenhouse gas generation. Because the material locks carbon dioxide inside, “plastic is actually one of the best ways to keep carbon dioxide out of the atmosphere,”

To maximize sustainability...

- ✘ Reduce weight
- ✘ Conserve
 - ✘ Raw materials
 - ✘ Energy
 - ✘ Discards
 - ✘ Greenhouse gas emissions
- ✘ Maximize product-to-package ratio
- ✘ Be prepared to make tradeoffs

notes Enneking, who is working with other PVC suppliers to dispel misconceptions about the environmental attributes of the material.

Nevertheless, the most environmentally friendly choice is rarely obvious, says Enneking. Typically, a material ranks superior in some attributes, but not others. Evidence also must be considered based on application because an examination of the same four polymers in the drink cup study could yield entirely different scores when used in a different type of packaging.

Plastic/chalk blend improves 'green' profile of pouch

Ecolean Sustainable Packaging, a new concept from Ecolean AB, Helsingborg, Sweden, supplies brand owners with both preformed pouch material and a turnkey filling line for dairy products, liquid foods and wine. Already commercial in China, the Russian federation and parts of Europe the Calymer packaging material consists of at least 40% calcium carbonate (chalk) bound together by polyethylene and polypropylene.

The Ecolean pouch offers significant opportunities for source reduction since it weighs 40%-45% less than a carton and 60%-65% less than a plastic bottle of the same volume. It also flattens for disposal and permits complete evacuation of the contents. Recovery options for used pouches depend on local collection and recycling practices and include recycling with mixed plastics to make products such as pallets and artificial wood, *recycling in the high-density polyethylene stream (as long as concentrations of the Calymer material do not exceed 20%)* and energy recovery via incineration, currently the most likely recovery scenario in most areas.

Options include easy-open features, reclosable caps, and integral air-filled handles, which simplify pouring and help the pouch stand upright. Compatible with freezing and microwaving, the food-grade material is printed and converted into preformed and -sealed pouches and wound on reels. The EL1 filler handles fills of 500 and 1000 milliliters (ml) at 48 per minute, while the EL2 machine fills 200- and 250ml at 90 per minute and 500ml slim designs at about 83 per minute. Lines can include secondary packaging equipment to load pouches into returnable plastic crates or recyclable corrugated cases.

Source Reduction

Barrier coating allows wine to move into lighter bottle

An ultra-thin coating of silicon oxide is all that's needed to give a polyethylene terephthalate (PET) bottle sufficient barrier properties to protect the shelf life of wine. At approximately one-tenth the weight of the average glass bottle, the coated PET containers reduce energy consumption and greenhouse gas emissions throughout the supply chain.

Painted Turtle wine from Artisan Wine Co., Oliver, BC, Canada, sells at outlets operated by the Liquor Control Board of Ontario (LCBO), Toronto, ON, Canada. "LCBO works with suppliers to offer more products in alternative packaging, such as PET... bottles, because each plastic bottle contains significantly less material than each comparable glass bottle," explains David Fallis, vp of Operations for Artisan Wine Co.

Artisan offers Semillion/Chardonnay and Cabernet/Shiraz in 750-milliliter coated PET bottles from Ball Corp., Broomfield, CO, with aluminum screw caps from G3 Enterprises, Modesto, CA. Ball applies the coating to bottle interiors using Plasmax technology from SIG Plasmax GmbH, Hamburg, Germany, which is part of SIG Holding Ltd., Neuhausen, Germany. The transparent, ultra-thin coating measures less than 100

nanometers and resists cracking, abrasion and delamination. It also doesn't age and limit the length of time bottles can be stored before filling.

The coating, which is easily removed during the recycling process, exhibits no negative effects on the recycled PET, a fact confirmed by Petcore, Brussels, Belgium, a trade association dedicated to PET and PET recycling.

At present, Ball is the only North American source of barrier bottles using Plasmax silicon oxide coating technology.

The LCBO offers at least one other wine in PET bottles, Yellow Shirt from Boisset Vins & Spiritueux, Nuits-Saint-Georges, France. It takes a slightly different route to product protection, a monolayer blend of PET with an oxygen scavenger. Containers blowmolded by MPI Packaging Inc., Toronto, ON, Canada, start out as injection-molded preforms made by Constar International Inc., Philadelphia, PA, from MonOxbar resin, a blend of Constar's patented Oxbar™ oxygen scavenger with ultraviolet-light-blocking PET from Eastman Chemical Co., Kingsport, TN, plus light-blocking dead leaf green colorant. A 30-millimeter polyethylene-lined Stelvin screw cap from Alcan Inc., Montreal, QC, Canada, completes the 750-milliliter package. The container reportedly cuts package weight by more than 80% and is helping the LCBO reach its goal of reducing packaging waste by 10 million kilograms per year.

Renewable Materials

Primo Water launches single-serve product in PLA

Primo Water Corp., Winston Salem, NC, focuses on providing mineral-enhanced water with environmental benefits. When it decided to add a single-serving product to its refillable 3-, 5-gallon containers and Energy Star-rated water cooler, it chose a 16.9-ounce polylactide (PLA) bottle. A tamper-evident, natural high-density polyethylene cap and polyethylene terephthalate (PET) label complete the primary package.

Primo chose Ingeo (formerly NatureWorks) PLA from NatureWorks, LLC, Minnetonka, MN over PET because it is derived from corn, a renewable resource. This translates into an 80-90% reduction in carbon dioxide emissions and a savings of 65% in fossil fuel resources. Primo water is not the first bottled water in PLA, but is the first one in national distribution and probably the only one on the market currently since Biota, the Colorado company that pioneered water in PLA, went out of business.

"With Primo, consumers have told us they feel good twice; once for promoting their own health by drinking more water and avoiding sugar, and twice, for helping to preserve the precious and depleting resources of our planet," says Dave Burke, president and chief operating officer of Primo To Go.

Primo encourages consumers to "please renew" and dispose of the bottle by recycling, composting or incineration. However, Primo also recognizes many consumers have no access to any of these options for PLA, so it plans to convene a consortium this summer to begin developing long-term, effective, efficient processes for renewing bioplastics.

Considered a mid-market water, Primo sells in 18-count shrink film multipacks for a suggested retail price of \$4.99. It's one of about a dozen beverages currently sold worldwide in bioplastic containers, according to estimates by European Bioplastics, an industry association based in Berlin, Germany.

Compostable PLA moves into shrink labeling

Poly lactide (PLA) brings a renewably sourced, compostable option to shrink sleeve labels, which typically are made of polystyrene, polyvinyl chloride or polyethylene terephthalate glycol. One of the first users of a PLA shrink label, Agro Labs, Inc., a wholly owned subsidiary of Integrated BioPharma, Inc., Hillside, NJ, specifies it on bottles of Naturally brand liquid dietary supplements.

The EarthFirst PLA full-body shrink label from Seal-It division of Printpack, Inc., Farmingdale, NY, not only replaces the pressure-sensitive label used previously, but also the secondary carton. An extraordinary shrink factor enables the high-gloss PLA film to hug the contours of the uniquely shaped 24-, 32-ounce clear glass bottles and project an upscale appearance. NatureWorks LLC, Minnetonka, MN, supplies the PLA resin to Plastic Suppliers, Inc., Columbus, OH, which makes the film and ships it to Seal-It for printing and converting into labels. The labels are printed rotogravure in eight or nine colors.

Deposit exemption boosts bioplastics in German market

In Germany, bioplastic beverage containers have received a boost by winning an exemption from the country's compulsory deposit law.

The 5th Amendment to Germany's Packaging Directive, which takes effect on January 1, 2009, and expires on December 31, 2012, exempts any single-use bioplastic drink bottle from Germany's compulsory deposit law as long as it is certified compostable and "produced from at least 75% renewable resources." The amendment should stimulate the market for bioplastic containers as well as the development of sorting and recycling systems.

"Through this regulation, the Federal Government is encouraging the use of renewable resources in beverages packaging and therewith a substantial innovation from the plastics industry," states Dr. Harald Kaeb, chairman of European Bioplastics, Berlin, Germany, an industry association. "This provides strong support for the market introduction of bioplastics," he adds.

However, beverage makers that switch to bioplastic bottles still must participate in Germany's dual system for recycling. With industrial composting capacity not readily available, in the short term, most of the bioplastic bottles recovered are likely to be burned to generate heat/energy.

Recycling/Recycled Content

Low levels of PLA contaminate RPET for packaging

It doesn't take much polylactide (PLA) contamination to ruin the quality of recycled polyethylene terephthalate (RPET).

In fact a study by PTI-Europe SARL, Yverdon-les-Bains, Switzerland, commissioned by the Technical Committee of Petcore, Brussels, Belgium, indicates PLA causes problems at levels of less than one bottle per 1,000 PET bottles. Testing shows that PLA levels of 0.1% affect the color and clarity of RPET to the point that even slightly contaminated material may only be suitable for fiber applications instead of bottles or sheet. This low level of contamination also causes processing problems because PLA's lower melting point results in sticky flakes that adhere to each other, to the RPET and to the equipment.

Unfortunately, it appears that Europe's current best practices for sorting, which involve a trio of near-infrared sorters working in tandem, cannot capture enough PLA

bottles to prevent problems. In fact, PLA containers slip through even when the equipment is set so high it rejects too many PET bottles. Thus, to protect the quality of RPET containers and sheet, Petcore advocates establishing PLA recovery and recycling capabilities even before a small number of PLA containers arrive on the market.

About the author

Hallie Forcinio has covered packaging-related environmental topics for more than 20 years, first as an editor on *Food & Drug Packaging* magazine and more recently as a freelance packaging journalist. "My interest in the environment dates back to a high school government class," she notes. "I was collecting glass, newspapers and aluminum cans for recycling long before my community had a curbside recycling program."

In addition, to preparing the *TricorBraun Sustainability Times*, she contributes articles to numerous trade publications including *Packaging Machinery Technology*, *Pharmaceutical Technology*, *Managing Automation* and *Ben Miyares' Packaging Management Update*, the weekly e-newsletter that posts each Monday on Packexpo.com.