by Aaron L. Brody

Paper and paperboard *represent the largest category of food packaging materials worldwide, and corrugated fiberboard packaging is a mainstay of packaged foods distribution.*

Paperboard Package Recycling: A Success Story

The other day we received an electronic packet from a paperboard packaging advocacy group indicating they were ratcheting up their responsibility messages on their favorite material to our favorite consumers, those Americans who eat packaged food. Paper and paperboard comprise the largest single-category food packaging materials in the U.S. or the world. This is largely because of the quantities of corrugated fiberboard employed for distribution packaging. Although estimates are that more than 70% of all foods come into contact with plastic at some time during their distribution, direct contact with food contents does not necessarily add up to large-volume commercial application.

And so when the paper and paperboard folks politely offered to update our meager intellectual base, we could not contain ourselves, especially from the perspective of having been previously regaled with all sorts of knowledge on glass, metal, plastics, and even wood.

Paper and Paperboard in Food Packaging

Despite our own past employment with paper- and paperboard-focused companies, we must assert that most of these episodes concentrated on filling some of the white spaces surrounding plastic primary packaging and means to unitize glass bottles and metal cans, all of which were rewarded with ample awards and returns. We remain dedicated to the proposition that *all* package materials and structures shall enjoy roles in our food horizons in the predictable future—at least as long as consumers elect to acquire packaged foods and food marketers strive to serve consumers. With all of these caveats, we now drill more deeply into the realm of paper and paperboard recovery and recycling as holding a leading-edge position in our current universal concern over planetary sustainability under the weird "paper or plastic" scenario being played out in so many grocery checkout venues.

Paper and paperboard comprise about 40% of packaging overall and 40% of all food packaging, in particular, regardless of geography in the industrialized world. Relatively little white paper or paperboard is directed to food packaging. It is the brown board that dominates—the multilayer laminated board with the flutes. Regardless of the decades-long attempts to convert distribution packaging into the shrink-and-stretch-plastic-film-bundling universes, corrugated fiberboard casing remains the bulwark of the function and even the reference to measure the economy. As corrugated goes today, so goes the economy tomorrow.

A much smaller fraction of paperboard enters into cartoning to contain dry foods such as rice, beans, and raisins; the inner film bags of dry cereals, cake mixes, cookies, crackers, and (using a lot of white bleached board) frozen foods. Reflect for a moment on the quantities of paperboard you break apart to access a frozen pizza, ice cream, or a case acquired from your local Costco. And, by the way, not a lot of paper per se is applied in food packaging (paper is the thin flexible material; paperboard is the material that is 10 points or more—usually up to about 40 points, where a point equals 0.001 inches).

According to our newly organized, earth-friendly Paperboard Packaging Alliance (www.paperrecyles.org) about 90,000 tons of paper and paperboard packaging material is produced annually in the U.S.—about the same as in 1993. The numbers of cases and cartons for foods represented by this tonnage can only be triangulated at something on the order of 50 billion—overwhelmingly secondary and tertiary packaging.

But—and these are the top and bottom lines—an impressive 57% of all paperboard packaging is recycled back into more paperboard packaging, the highest ratio in history of any package material—and the proportion is increasing. According to the statisticians with both the paperboard and aluminum lovers' trade associations, this exceeds the rate and volume of all other package materials, including aluminum cans with a longtime historical 55% recovery rate of their 100+ billion units.

Packaging observers note the tailwinds thrusting these trajectories upwards linearly—more infrastructure into which consumers may deliver their booty, more money paid for the used materials, and increasing concern over planetary environment.

A Look Back

Packaging historians note that paper and paperboard have been recycled virtually since the commercial introduction of the materials during the early nineteenth century. Both economics and technologies dictated or urged that scrap could be reincorporated as much as possible into new paper or paperboard. Because of the enormous investments required in Fourdrinier moving-screen hardware and infrastructure (woodlands, water, and energy) to produce paper and paperboard, cost containment could be achieved mainly by recycling—largely mill and converting scrap, which comprises up to a quarter of the volume. Later, by introducing post-consumer-waste collection of products including newspapers, office paper, and grocery store corrugated fiberboard, the proportion of recycled material rose to around 50% during World War II. A complex but extraordinarily functional infrastructure was constructed to enable the recovery. Location was important; virgin paperboard mills were located in remote places near the raw material sources among the Southern pines, for example. Simultaneously, cylinder mills to recycle used paper were largely sited on rivers in cities near their raw materials.

Paper and Paperboard Recycling Technologies

The technologies to recover used papers were relatively simple. With enough water, friction and agitation, secondary fibers could be separated and reconstituted into new, shorter fiberboard structures that could be used as newsprint, "gray back" board for secondary packaging, or the fluting medium for corrugated fiberboard. Issues such as removal of printing inks, coatings, and extraneous "junk," manual segregation of various different papers for ease of recycling, and, interestingly, combinations with plastic challenged paper technologists who developed methods that are being applied today. Blends of virgin and recycled were introduced and accepted by commercial and regulatory interests, thus connecting the two effectively for the first time. As the external pressures for recycling package materials soared due to energy, raw material depletion, environmental forces, consumer consciousness, and possibly personal guilt, innovative technologies for dramatically reducing chemicals, water, and energy use closed loops and increasing recycled content were implemented. Some mills today have reached the level of self-generating two-thirds of their own energy from bark, sawdust, and other non-recoverable sources. Bleach liquor is rejuvenated for reuse. Regulatory authorities are permitting greater latitude in types and quantities of secondary materials in food contact.

The bottom line is that paper and paperboard package recycling is targeting a 60% recovery rate and attempting to incorporate a much higher fraction of consumer materials, which are now at only about 20% of the inputted materials. Incredibly, some 80% of all corrugated paperboard is recovered for recycling, if industry representatives are to be believed. Simultaneously, paper and paperboard interests are more loudly proclaiming their virtues—especially by correcting the incredible misinformation that pervades the popular (and often even the so called objective, scientific) media. Despite all the best efforts

***Paperboard packaging** is reportedly recycled at a rate greater than any other packaging material.* Photo copyright © iStockphoto.com

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Paperboard Package Recycling: A Success Story continued...

by plastic, metal, and glass suppliers, paper and paperboard represent three-fourths of all package materials that are recycled or in any way recovered, and that warrants accolades for this great industry group.

The Statistics

In the "save the trees" category, several data proof points that truly upset conventional wisdom should be noted. Consider that 1.7 million trees are planted each day, specifically to sustainably provide the tonnages required for paper and paperboard. Forest acreage has grown nearly 40% over the past half century—demonstrating that the forest products industry has just started reforesting this renewable resource. Paper and paperboard recycling has grown nearly 80% since 1990, fueling this ramping upward of environmental responsibility. Forest products industry researchers have computed that their industry has reduced its carbon footprint 14% during this century. To express it in a different way, the carbon sequestered by forest products annually offsets about 10% of U.S. carbon dioxide emissions.

Reflections on Recycling Success

These industries and infrastructures were invented and refined over the past century to serve economic ends and, incidentally, to help the planet, but the ultimate purpose has shifted. No question, today's enhancements are certainly producing economic benefits, but the "greenies" should be pointing to paper and paperboard as exemplary standards. At the same time, dear readers, more than 100 years and literally billions of dollars have been invested to reach this altitude. Therefore, patience, thought, and imagination are required as steel, aluminum, polyester, polyethylene, and the many other "polys" polymerize into viable systems that can operate with the efficiencies and outputs of paper and paperboard recycling.

And so consumers will be showered with accurate and meaningful messages (hopefully mostly electronic to save paper for important functions such as food packaging) from the Sustainable Forest Initiative and other sustainability programs citing the progress and, in particular, the more recent initiatives to help stabilize and responsibly grow food packaging (www.sfiprogram.org). And we food scientists, food technologists, and packaging technologists will understand that although we cannot apply paper and paperboard to all, or even most of our primary packaging, it still plays that vital role in the indispensable distribution aspects and remains first in volume and in recycling—both facts consequential in our thinking as we innovate to serve our consumers. **FT**

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