

Focus '95+ puts recycling in perspective

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Recycling has become an inescapable fact of business for most papermakers. Political and economic pressures are forcing mills to adopt recycling technologies and incorporate recycled fibers into many of their paper products. At the same time, those pressures are making recycling economically feasible.

In response to the impact recycling is having on the industry, six industry, academic, and government bodies banded together to sponsor "Focus '95+" in Atlanta, Ga., March 19-21. The sponsors included TAPPI, the American Paper Institute, the Institute of Paper Science and Technology, the National Council of the Paper Industry for Air & Stream Improvement, PIMA, and the USDA Forest Service, Forest Products Laboratory. The landmark collaboration gave attendees "a unique opportunity to explore strategies and technologies for meeting the 40% recovery objective of the coming decade."

Public interest in recycling was piqued 21 years ago by the first Earth Day, but the commitment to follow through was lacking. For the general public, the convenience and nominal cost of just throwing away their garbage far outweighed the effort required to sort, bundle, and transport paper and other reusable items.

Two important changes have occurred during the intervening years: It's getting harder—and more expensive—to get rid of solid waste, and the public has become more concerned about environmental issues and more willing to act on their concerns.

Although the public sees recycling as the primary solution to the solid waste problem, there are practical limitations to how much of the problem recycling alone can handle. The paper industry has set a goal to reach a recovery rate by 1995 of 40% of all paper consumed in the United States. By 1990, the industry had exceeded a 33% recovery rate, noted keynote speaker Gene Cartledge, chairman and CEO of Union Camp Corporation in Wayne, N.J., and chairman of API's Task Force on Solid Waste. But by 1995, a major constraint may simply be availability of recoverable materials, Cartledge indicated. By 1995, two-thirds of all corrugated boxes produced, half of the newspapers published, half of the high-grade white papers, virtually all the pulp substitutes, and 40% of the unsorted mixed paper will be required to meet the goal, he said.

So the long-term challenges are to establish private and public partnerships to build a network of recoverers and dealers, to involve the millions of Americans in the effort, and to tailor waste recovery to geographical realities.

TAPPI President F. Keith Hall, left, shakes hands with American Paper Institute President Red Cavaney, right, following their wrap-up speeches at the Focus '95+ symposium chaired by James River Corporation Vice President Robert C. Martin, center.



"The most constructive role for the government is to work with us to expand the recovery of recyclable paper, not to prescribe the fiber content of end-use products," Cartledge said. "The utilization is going to have to be determined by technology, economics, and market forces, which together will move grades of recycled papers into their most economical and efficient use," he said.

Yet, Cartledge added, "As hard as we all work and as much creativity as we put into the issue, the simple fact is that we simply cannot recycle our way out of the solid waste problem. We've got to embrace other issues, we've got to have a more competitive and comprehensive strategy for solid waste." Recycling must be integrated with other solutions, such as incineration for energy recovery, composting, market-driven source reduction, and landfilling.

Composting

Robert Greene, director of global professional and regulatory services for Procter & Gamble Co., Cincinnati, Ohio, emphasized that an integrated approach to solid waste reduction is needed. Recycling is certainly part of the answer, but composting and integrated waste management should also be considered, he said.

"Composting represents an opportunity to recover additional paper waste not otherwise recyclable," Greene said. "Municipal solid waste composting can divert as

much as half of all solid waste from landfills," he said.

Preprocessing is an important step that involves separating and removing recyclables and unwanted materials, and sizing the compostable material. "The subsequent composting, curing, and refining steps produce a finished, market-ready compost in three to six months," Greene said. Although the benefits of compost as a soil improvement have been well documented and many communities are starting composting projects, the compost markets are just being developed. Several states have developed standards for compost use to protect public health and the environment. The composting industry is also developing and recommending standards for quality compost and plant designs.

Alternative products

The USDA Forest Service is also conducting research on various uses for recycled materials. Thomas E. Hamilton, associate department chief for research, reviewed some of the work being done at the Forest Products Laboratory in Madison, Wis. Among the reasons to consider alternative uses are that they require no deinking or bleaching, they reduce landfilling of sludge, and they stimulate improved availability of virgin fibers, Hamilton told attendees. One of the uses developed by the Forest Service is "Spaceboard," a strong, lightweight material made by press-drying recycled fibers. Its uses range from corrugated containers to building materials. Mixed wood and plastic products can also be combined to form a moldable composite. In addition, the Forest Service is investigating alternative uses for pulp and paper mill sludges, such as energy production, composting, fertilizer, and feedstock.

Trees are still needed

A concern is that the focus on recycling will divert attention from the primary source of wood fiber: trees. Not only will virgin fiber continue to be a vital ingredient in the papermaking process, but the forests grown and harvested to supply that fiber benefit the environment.

Kenneth R. Gilbreath, director of manufacturing services for Chesapeake Paper Products Company in West Point, Va., demonstrated that environmentally based decisions are more complicated than they might first appear. While mills using recycled fiber may use less energy than mills using virgin fiber, the typical recycled fiber mill uses 100% fossil fuels. In contrast, mills using virgin fiber may use bark and wood chips as part of their power source.

Another concern is CO₂ emissions. Mills using recycled fiber emit only about one-third the CO₂ produced by mills using virgin fiber. However, the forests that supply virgin fiber play a significant role in processing CO₂ out of the atmosphere. So, through reforestation and use of wood for energy, virgin fiber mills can actually have a positive impact on the atmosphere, Gilbreath indicated.

Robert P. Bartels, general manager of the bleached board division of International Paper Company in Mem-

phis, Tenn., also noted that about one-third of the United States is covered by trees, the annual growth rate exceeds removal by 20%, and that 45% of the paper industry's energy requirements are obtained from forest waste. Through wood scrap, the paper industry indirectly converts solar energy to steam and electricity. "The amount of energy generated is equivalent in value to 100 million barrels of oil per year," Bartels said.



Less packaging, less waste

Solid waste reduction is another area in which the packaging segment of the paper industry has made specific contributions. Foods shipped in paper cartons and containers weigh less, require less space, and stay fresher than unprocessed foods. That saves shipping costs, reduces the amount of food wasted, and eliminates a considerable amount of garbage that consumers would send to municipal landfills, Bartels indicated.

"Through innovative package design we are able to create packages that protect and preserve the quality of the contents," Bartels said. In addition, design changes over the past 20 years have reduced the amount of material needed to produce various containers. "By reducing the basis weight of the paperboard used to make frozen foods cartons the same structural characteristics are preserved today using 40% less fiber," he said.

Yet packaging itself can pose a challenge when it comes to recycling. Some recent innovations, such as barrier coatings, can eliminate the need for inner packaging. One type of carton used to package agricultural chemicals can be plowed into the soil after use. There it degrades over a period of several weeks.

From left, David V. Borowski, Green Bay Packaging vice president; Susan S. Levine, COMBIBLOC vice president; and Michael P. Bouchette, nonwovens manager for Wisconsin Tissue Mills, answer questions during a session on process and product innovation at Focus '95+.



Polycoated packaging

A relatively simple technique for recycling polycoated packaging such as milk cartons and drink boxes was described by Susan S. Levine, vice president of COMBIBLOC, Inc. of Columbus, Ohio. Juice boxes, for example, are about 70% paper, but their remaining components, polyethylene and foil, have made them impractical to recycle.

Working with the Aseptic Packaging Council, COMBIBLOC set up a pilot recycling program with the cooperation of several Pacific Coast schools. The school children were asked to throw away their juice boxes in specially marked containers. The containers were collected once a week by a waste hauler who had other contracts in the area. The boxes were then shredded, washed, and baled for transport to a hydropulper. The pulper beats the foil and polyethylene off the pulp and the components are separated. "Virtually 100% of the cartons can be recycled," Levine said. And because ink is not printed on the paper, the recovered fiber is very clean.

Steam explosion technology

Steam explosion is one of the newest pulping technologies being applied to secondary fiber processing and deinking. Michael P. Bouchette, nonwovens manager for Wisconsin Tissue Mills in Menasha, Wis., outlined the steam explosion process he's been working with. It begins with dampened, shredded waste paper being conveyed to a feed hopper, then through a screw auger to a reciprocating piston which drives the dampened paper up against a choke on the other end of the chamber. At a certain density, the choke backs off and the compressed pulp is fed into a second chamber. As the pulp enters the second chamber, it is hit with a burst of high-temperature, high-pressure

steam. That causes instant saturation and a tremendous solvating action because of the high temperature. The material is then taken by another screw auger to a digester. Unlike conventional processes, dwell time is only one to six minutes in the steam explosion process Bouchette has been using. Another screw auger takes the pulp to a blow valve, from which it is instantaneously decompressed and then starts to cool down.

Independent analysis of the results confirmed that fiber produced using the process was not degraded and had smaller residual particles than fiber processed conventionally. The implication is that the smaller particles can be removed more easily, with less-complicated equipment, Bouchette said. Results of commercial trials were so good that the researchers decided to look at reject grades as furnish, including coated material, office waste, and reject corrugated with 20%-30% polyethylene. Although the plastic did show up, it was as sand-size that could easily be removed downstream. Even telephone book bindings were sent through the process and very good fiber separation was obtained.

Further advantages to the process include reduced energy consumption, reduced production steps, and reduced need for chemicals.

The process is being turned to commercial use through Recoupe Recycling, an independent company formed through a partnership of Chesapeake Corporation and Stake Technology.

Costs: hypothetical case studies

While recycling has the appearance of being a good idea, from both competitive and energy use standpoints, how good the idea is in practice will vary from mill to mill. To illustrate that point, Kari V. Pesonen of Jaakko Pöyry Consulting in Tarrytown, N.Y., presented a series of hypothetical case studies comparing energy and manufacturing costs for virgin vs. recycled paper production at various locations.

Among the variables Pesonen considered were mill location, type and availability of fiber, process energy and chemical requirements, and paper grade. For example, newsprint production costs at a hypothetical eastern Canadian mill were compared with costs for a hypothetical mill in the southern United States. In the analysis, key differences included the cost of softwood, US\$ 43/dry ton in the South vs. US\$ 90/dry ton in Canada; the average waste paper cost, US\$ 35/ton in the U.S. South vs. US\$ 60/ton in Canada; and the cost of power (US\$ 45/MW·h in the South vs. US\$ 27/MW·h in Canada). Power requirements were more for mills using virgin fiber (>3 MW/ton vs. <1 MW/ton), but chemical costs were more for mills using recycled fiber. In the U.S. South the virgin furnish cost is higher, US\$ 240/ton vs. US\$ 170/ton, primarily because of higher energy costs.

In the end, newsprint made from recycled fiber costs less to manufacture than does newsprint using virgin

fiber, US\$ 320/ton vs. US\$ 390/ton, in this analysis. In Canada, the situation is similar, but the differences are not as great because of lower power costs and greater waste paper costs. In contrast, lightweight containerboard is theoretically cheaper to manufacture using virgin stock.

F. Keith Hall, TAPPI President and chief scientist for International Paper Company, and Red Cavaney, American Paper Institute President, summed up the conference with wrap-up speeches on the final day. Highlights of their speeches are given in their editorials in this issue.

Full proceedings from Focus '95+ are available for US\$ 79 member price, US\$ 119 list price. The Order No. is 01051591. To order, call the TAPPI Service Line toll-free at 1-800-332-8686 (U.S.) or 1-800-446-9431 (Canada).