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RECYCLING
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Wood waste recovery grinds out new success

by Steve Apotheker
Resource Recycling

✓ **Using the FHE Wood Waste Tub Grinder to process wood.**

Wood waste processing sites are showing up in more communities. Wood waste is composed of pallets, crates, furniture, roofing material, dimensional lumber and plywood, but does not include woody material normally generated as yard waste. However, wood waste and yard waste can be handled by the same processing system easily, efficiently and profitably.

The State of Washington found wood waste made up 5.5 percent of its waste stream, or about 127 pounds per capita per year. The amount of wood waste available is especially sensitive to construction and demolition activity. Approximately half of the wood, according to the Washington survey, came in via debris boxes and other self-haul vehicles.

Other wood waste studies show a range of 50 to 200 pounds per capita. In particular, one study that sampled demolition and construction debris indicated wood was 20 percent of the total. The density of this loose wood waste averages about 350 pounds per cubic yard.

Table 1 — Wood waste processing systems

	Company	Processing system	Capital	Area	Labor (1)	Annual volume (tons)
✓	Advanced Enterprises Recycling, Inc. Newark, NJ	3 portable tub grinders 3 front-end loaders 2 excavators with grapples	$1,500,000	5 acres	9-11	52,000
	Marin Resource Recovery Center San Rafael, CA	400 hp high speed shredder 110 cy storage silo	$ 600,000	0.15 acres	7	30,000
✓	Recycled Wood Products Inc. Woburn, MA	tub grinder trackdozer	$ 250,000	5 acres	4-5	10,000
	Rosetto Recycling Toms River, NJ	400 hp high speed shredder vibrating screen front-end loader	$ 600,000	3 acres	5	16,000
✓	Zanker Road Resource Management San Jose, CA	2 tub grinders 2 cleaning systems 2 backhoes	$1,750,000	5 acres	10-12	40,000

cy = cubic yards
hp = horsepower

(1) In units of full-time equivalent positions.

Source: Interviews conducted by *Resource Recycling*, 1990.

Factors influencing recovery

A number of wood waste processing programs have started in the past four years (for a sampling, see Table 1). There are three factors that are stimulating the growth in wood waste programs.

First, high landfill fees in the Northeast have provided incentive enough for the private sector to offer a wood waste recovery option. One of the largest wood waste recovery programs on the East Coast is Advanced Enterprises Recycling, Inc., (AER) of Newark, New Jersey, which is operated by Anthony Peterpaul, Sr., Frank Peterpaul and Anthony A. Peterpaul. The Peterpauls' first business, however, was pallet construction and rebuilding. With landfill fees surging to over $100 per ton, they were motivated to find an alternative for their excess wood waste.

Second, wood waste processing is a less expensive program to capitalize than other solid waste technologies. For example, the capital cost per ton of daily capacity for a wood waste processing system is $20,000 to $40,000 (see Table 1), only one-third of the capital cost per ton of daily capacity needed for incineration.

Third, wood waste recovery is very compatible with yard waste processing programs. Wood is wood and the shredders don't care where it comes from. Mecklenburg County, North Carolina gained plenty of experience with wood waste and brush processing when Hurricane Hugo left 1.5 million cubic yards of woody material in its wake last September. The county is now going forward with a processing site to handle 50,000 tons annually of material — 70 percent yard waste and 30 percent wood waste. Fred Remington, recycling coordinator for the county, sees the county's $1.1 million investment in equipment as a real bargain for this level of recovery.

One attraction of wood waste compared to the green wood in yard waste programs is a higher energy value due to its lower moisture content. This makes a more valuable product for the boiler fuel market.

Material preparation

Some companies will take wood waste commingled with other construction debris, while others require separation. AER will accept only pure loads of wood from its customers. AER's tipping fee is kept low relative to the landfill fee so that there is an incentive to perform this separation.

Frank Peterpaul admits, "Recycling can be a tedious process. At job sites people are ripping the shingles off the wood to prepare it for recycling. But what else are we going to do? It's an effort that has to be made. We don't have landfill space."

Rosetto Recycling in southern New Jersey takes mixed debris boxes and separates out the old corrugated containers, scrap metal and wood. Any wood material is then graded into clean lumber with no glues or contaminants, intended for a compost market, or into wood with paint or glue, destined for a fuel market.

A number of these companies will also accept yard waste. However, often the yard waste with its natural appearance is kept separate because of its higher appeal to the mulch market.

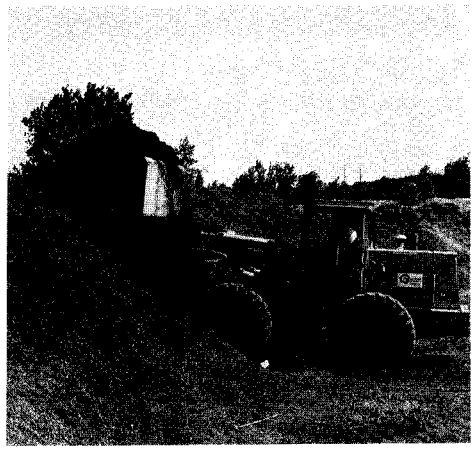
Quality control is very important. Creosoted lumber (such as railroad ties), pressure-treated lumber and lead-painted lumber are usually not accepted because of environmental problems related to processing or market use. Nails and other ferrous metal in the wood can be removed by magnets during the processing and are not considered to be a problem.

As material arrives at a site, it is dumped on the ground for a visual inspection. This allows workers to begin separating material from a mixed debris box or removing any obvious contaminants from an all-wood load.

Processing

Processing wood waste involves volume reduction for a specific market, metal removal and elimination of other contaminants such as fines and plastics. Zanker Road Resource Management in San Jose, California uses a mechanized approach designed by Jesse Weigel, the company's president, to handle mixed construction and demolition debris. The material is sent up an inclined conveyor to a horizontal vibrating screen. It is then dropped into an eight-foot-deep water tank. The heavier rock and concrete fall to the bottom and are removed by a conveyor belt. The floating wood is moved across the surface by a water jet current. It falls onto a conveyor that carries it to a tub grinder. Metals are handpicked off an exit conveyor. A magnet is being added to speed up the processing.

Both AER and Recycled Wood Products, a Woburn, Massachusetts firm, start their processing by precrushing the wood. AER uses an excavator with a grapple, while Recycled Wood runs over the mate-



A front-end loader scoops up a load of finished wood chip mulch at Recycled Wood Products.

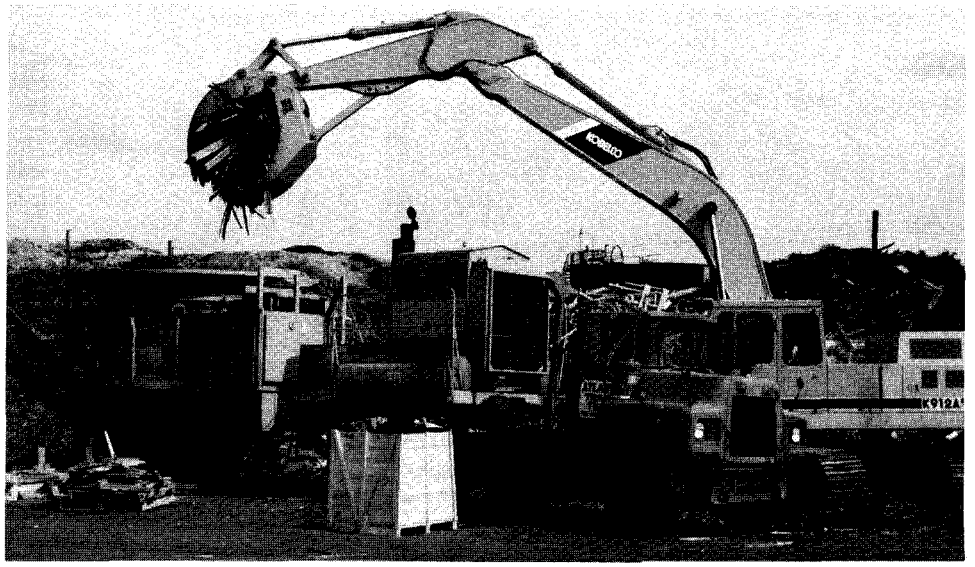
Table 2 — Wood waste economics (1)

Company	Landfill tipping fee	Wood waste tipping fee	Boiler fuel	Mulch
Advanced Enterprises Recycling, Inc. Newark, NJ	$100-120/ton	$5-$10/cy	$10-20/ton	$10-15/cy
Marin Resource Recovery Center San Rafael, CA	$6.50/cy	$6/cy	$30-34/ton	$19/ton
Recycled Wood Products Inc. Woburn, MA	$60-100/ton	$30-50/ton	$18/ton	$7.50/cy
Rosetto Recycling Toms River, NJ	$75-100/ton	$55-60/ton	0	0
Zanker Road Resource Management San Jose, CA	$17.71/ton (2)	$3.00-8.50/cy (3)	$35/ton	$8.50/cy

cy = cubic yards

(1) For purposes of conversion, 6 cubic yards = 1 ton for loose material; 4.5 cubic yards = 1 ton for chipped material.
(2) Landfill fee will increase due to recent state legislation.
(3) Fee is proportional to percent of wood in load.

Source: Interviews conducted by *Resource Recycling*, 1990.



An excavator with a grapple arm loads construction wood debris into a tub grinder at Advanced Enterprises Recycling's site.

rial with a trackdozer. In both cases, the broken wood allows for faster processing by a tub grinder with smaller, more uniform chips on the first go-round. Screens are used to determine the size of finished chips for a particular market.

AER also has three portable tub grinder units to serve large accounts, such as manufacturers, within a radius of several hundred miles of its main site. Usually two units are occupied with handling wood waste and the third with yard waste.

Rosetto Recycling uses a high speed shredder to produce chips that are two to four inches wide. If orders call for a smaller size chip, then the material is put back through the shredder.

The high speed shredders and tub grinders used by the surveyed companies are capable of processing rates that ranged from 10 to 20 tons per hour. These performance levels matched design expectations. All of the companies are quick to point out that attention needed to be paid to maintenance on a regular basis.

The companies also stress the need for attentive operators. Joe Garbarino with Marin Resource Recovery Center in San Rafael, California recalls his only breakdown in three years when four steel railroad rails got into the system. The magnetic detector shut the system down and employees found three rails. Upon restarting the system, the fourth rail got into the shredder and knocked a hole in its side.

Garbarino's operation has minimized labor at the back end of the processing system by conveying the material to an overhead silo with a capacity of 110 cubic yards. An open top trailer can be pulled underneath the silo for ease of loading.

Markets

The two basic markets for wood chips are as boiler fuel and landscape material. Other potential markets are as a bulking agent for sewage sludge and a drying agent for spills, and for animal bedding.

Recycled Wood Products has developed an arrangement to maximize the value of its wood chips. The dry construction wood is chipped and sent to sawmills in Maine for fuel. The company then backhauls more traditional-looking bark chips for use as mulch.

Cummings Properties Management Association has used wood chips generated by Recycled Wood Products for the past two years at its commercial office park in Woburn, Massachusetts. James McKeown, vice president of Cummings, says the company is pleased with the quality control. Aesthetically, the chips work well, although they are not the red bark mulch that people are used to seeing. However, the final decision to use the wood chips was driven by economics. It also seemed to be the ecological thing to do, since the company generates pallets and tree limbs that Recycled Wood Products can then convert into wood chips.

AER puts about 45 percent of production, usually the larger two- to three-inch wood chips, into the boiler fuel market. This market pays $10 to $20 per ton. Another 45 percent, made up of the smaller one- to two-inch chips, goes to landscape mulch that brings $10 to $15 per cubic yard. The final 10 percent of production is used for animal bedding and as drying agents for spills.

While AER has satisfactory markets, other processors in the area don't have it as good. Future growth will depend on creating market capacity.

Frank Peterpaul asserts, "Government agencies could be purchasing this material for use in their operations. Sewage treatment plant operators could get these recycled wood chips for half the price of new wood. Although the state department of transportation could buy recycled wood chips for ground cover and erosion control, it is not doing so."

Peterpaul is critical of the lack of help from the local utility and the absence of direction from the Public Utilities Regulatory Policies Act. The local utility, which sells electricity for $0.10 to $0.18 per kilowatt-hour, offers an avoided cost of only $0.03 per kilowatt-hour for any electricity generated from a small woodburning plant.

Economics attractive

There are two challenges to successful wood waste economics. First, the tipping fee at the wood waste facility must be low enough relative to the landfill's charge so haulers will take their debris boxes to the site with any needed preparation completed, such as sorting out the wood from other debris materials. Sometimes a more conveniently located wood waste processing site will offer a transportation advantage over a more distant landfill. The East Coast wood waste processors with high tipping fees at landfills are able to cover a greater percentage of their costs up front without depending on market revenues.

Second, the total income of the tipping fees plus revenues from marketed materials, including the sale of the recovered metals, must reach a break-even point on the order of $50 per ton (see Table 2). In fact, with a high enough tipping fee, Rosetto Recycling is able to cover all its costs and literally give the wood chips away to ensure access to sufficient market capacity. West Coast wood waste processing sites are able to offset lower landfill tipping fees by attracting higher prices from boiler fuel markets.

The economics of wood waste recycling are appealing to the private sector because of the huge volumes of material readily available without the need for an expensive separate collection system. The compatability of wood waste recycling efforts with burgeoning yard waste programs is attractive to the public sector.

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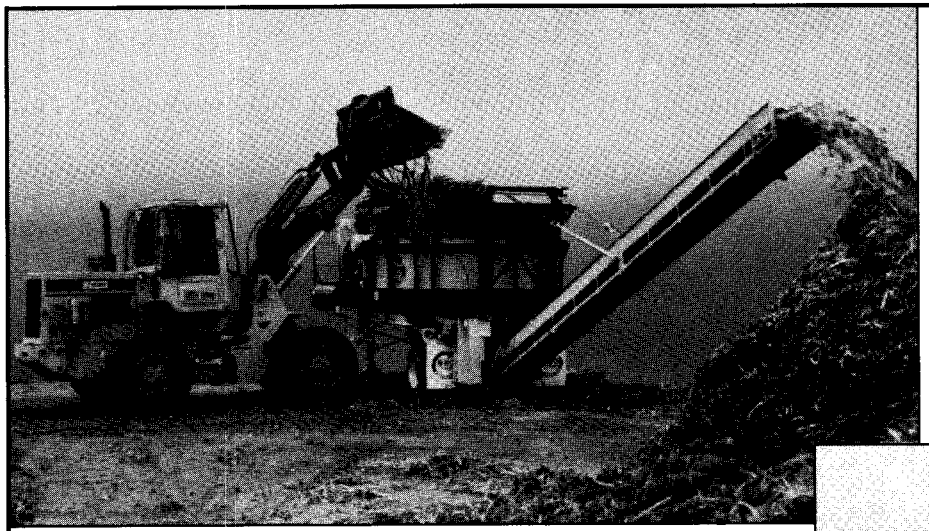

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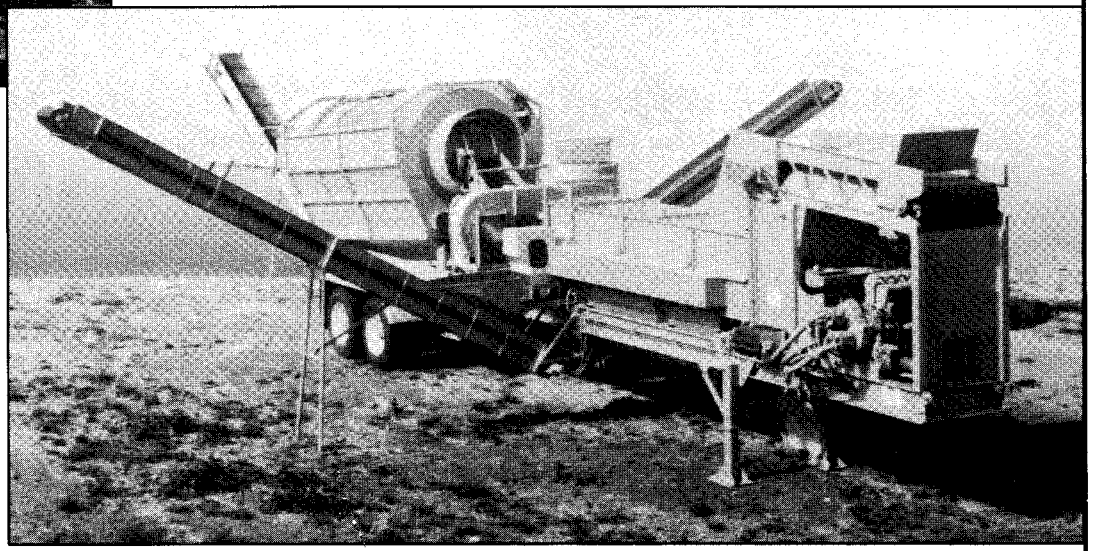

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