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Potential Effects of the Fuelwood Market on Wood-using Industries in Northern New England and New York

Susan B. Remington
Paul E. Sendak

Abstract

The increased use of fuelwood in northern New England and New York has raised concern about future supplies of manufactured wood products. Direct effects were measured by estimating the competitive advantages of the kraft pulp, waferboard, and oriented strand board industries in purchasing wood. Increased stumpage prices in the region would have the greatest impact on the reconstituted board industries.

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Increasing demand for fuelwood in northern New England and New York has raised concern about future supplies of timber for manufactured wood products. As voiced by an industry official, "Deriving heat from wood might be likened to burning a roll of bank notes instead of using the bank notes to buy something worthwhile" (Keil 1982). In the short-term, increased competition for the wood resource could result in higher wood prices. Higher prices would have the greatest effect on industries whose wood cost is a large part of product manufacturing cost. A long-term effect could be a decrease in future standing timber volume.

The use of wood fuel to a large extent complements timber harvesting and use. The wood products industry has become largely self-sufficient in supplying its own energy, burning logging and manufacturing wood wastes to generate process steam and electricity. Logging residues, including those from silvicultural operations that just a few years ago were uneconomical, are supplying wood for residential and institutional space heating and electrical power generation. Some of this material and timber cut for fuel are suitable for some manufactured wood products.

The primary purpose of this paper was to identify those wood products industries that are most likely to be in direct competition with fuelwood users and to rank them by their relative sensitivity to increased prices for wood.

Generally, hardwoods are used for residential heating. But a mixture of softwood and hardwood chips often is used for large applications such as electrical power generation. The industries analyzed here use hardwoods and softwoods. The analysis concentrates on low-quality hardwoods because it is this developing market that is of concern.

Increased use of fuelwood, changes in technology in the manufacture of traditional wood products, and development of relatively new wood products created markets for the low-quality hardwood resource in the 1970's. The major markets for low-quality hardwoods in northern New England and New York are for fuelwood and the production of kraft pulp, oriented strand board (OSB), and waferboard.

Since 1973, there has been a dramatic increase in the residential consumption of fuelwood. Residences alone in northern New England and New York burn more than 5 million cords of wood a year. Technology has made possible the cogeneration of electricity and industrial process steam by burning wood chips and wood-manufacturing wastes. Also, there has been an increase in the use of wood fuel by nonforest industries and institutions.

Hardwood kraft pulping produces higher yields and uses fewer process chemicals for a ton of pulp produced than softwood kraft pulping. Also, hardwood kraft pulp can be produced at a lower cost than softwood kraft pulp (Sandwell Consultants 1977). Although the shorter fibers in hardwood kraft pulp are a disadvantage in some applications, this pulp can be used in significant proportions in printing and writing paper, and also in container paper grades such as linerboard (Christie 1982). And new pulping processes such as thermomechanical pulping are broadening the range of products in which hardwoods can be used.

Reconstituted board plants in New England are close to supplies of low-quality hardwoods and to major consumer markets (Stone and McSwain 1980). This industry is growing faster than any other wood-product industry because of increasing prices for western plywood and the high transportation cost from West to East (Stone and McSwain 1980). Reconstituted panel products are substitutes for plywood sheathing in residential construction.

Conversion Return

If the real price of wood were to increase, it would be important to know the effect of this increase on wood-using industries. Conversion return analysis provides information on the cost structure of the wood-using industries. We used it to determine the industries that are likely to be more sensitive to an increase in wood prices.

Conversion return is the maximum dollar value that is available to purchase wood. It is the residual amount that remains after subtracting all operating costs, including depreciation and return to capital, from the expected selling price of the product. The operating costs are the fixed and variable costs of production, excluding wood. The return to capital is the amount deducted to ensure an economic return to invested capital, including working capital.

Conversion return values among wood-using industries and the cost and selling price of various products were analyzed on a unit of output basis. To facilitate comparisons among industries, the conversion return values were expressed on a ton of wood input basis. The common assumptions used for all industries were a 30-year life for mill or plant and the requirement of a 20-percent return on the average investment and working capital.

We did not attempt to survey industry costs in the study area. Existing studies were reviewed for applicability to the situation in northern New England. In all cases, a single plant or mill was chosen as typical of the industry—kraft pulp mill, OSB plant, and waferboard plant. To the extent possible, data were modified to more accurately depict the situation in the study area. All costs were expressed in 1980 value to facilitate comparisons.

Bleached Kraft Pulp

The kraft or sulfate process is more tolerant of species and wood quality than other pulping processes. The pulp mill in the analysis has a capacity of 260,000 to 270,000 air-dry short tons (Adt) per year, or 750 to 800 Adt per day. Cost information was developed for a mill located in the Southeastern United States (Sandwell Consultants 1977). Although costs are expected to be lower in the Southeast than in the Northeast, mainly because of lower labor rates, we believe that the information developed is indicative of the industry.

Conversion costs for 1980 are shown in Table 1. Costs for wood and chemicals were based on the assumption that 75 percent of the production was hardwood pulp and 25 percent softwood. In calculating wood costs, we converted 3.87 green tons of wood into 1 Adt of pulp at a cost of $19 per green ton.

Anderson and Bonsor (1981) provided information on the selling price of bleached kraft pulp and transportation cost. An average transportation cost was estimated at $35 with an additional $7 for transshipment and warehousing charges.

Reconstituted Wood Panels

The two types of reconstituted wood panels presented in this analysis are OSB and waferboard. The current wood mix for the production of OSB in New England, which is largely dictated by resource availability, is 60 percent white pine and 40 percent poplar. Waferboard also can be produced from hardwoods and softwoods. Low-density woods are preferred for the production of OSB and waferboard.

The production processes for OSB and waferboard are almost identical, hence the similarity in conversion costs. Yield from roundwood to boards should be about equal, perhaps favoring OSB. However, limited experience in New England indicates a more favorable yield for waferboard. Therefore, we assumed a yield of 1,000 ft^2 (7/16-inch basis) of board from 1.8 green tons of roundwood for waferboard and 2.0 green tons for OSB.

Oriented strand board. The initial investment for an OSB plant with production of 150 million ft^2 per year was an estimated $35.3 million (Kidder, Peabody and Co. 1980). Capital and production costs, excluding wood, were calculated for a plant in the Midwest (Table 1). The wood cost was $19 per green ton. Selling price and transportation cost to the Boston market were derived from conversations with industry officials.

Waferboard. The initial investment for a waferboard plant with production of 160 million ft^2 per year was an estimated $27.4 million (Kidder, Peabody and Co. 1980). The investment analysis included capital and production costs for a plant in New England (Table 1). Selling price and transportation cost to the Boston market were derived from conversations with industry officials.

Table 1.—Conversion costs per ton of wood input by product, 1980

Cost item	Kraft pulp	Oriented strand board	Waferboard
		Dollars	
Labor	10.21	8.00	7.08
Other	9.14	2.50	2.78
Energy	6.33	4.50	5.28
Resin and wax	—	14.00	15.97
Chemicals	10.55	—	—
Administration	4.54	13.60	15.00
Depreciation	9.72	3.92	3.17
Total conversion cost per ton of wood	50.49	46.52	49.28

Results of Conversion Return Analysis

Table 2 summarizes the results of the conversion return analysis for the three products. Line 1 is the conversion cost for each product (last line in Table 1 multiplied by the amount of wood input required to make a unit of product). Added to this value is the return to capital and the transportation cost to market. Line 4 is the sum of these numbers (excluding the cost of wood). This sum subtracted from the current market price for the finished product yields the conversion return, or the amount available to purchase the wood raw material needed to make the specified amount of board or pulp. Line 7 is the conversion return expressed in dollars per ton of green wood input.

Kraft pulp has the largest conversion return per ton of wood input, $21.09, and OSB, the smallest, $17.55. The return for waferboard is $18.73. The cost of producing kraft pulp generally is higher than that for the other wood products industries (Table 1). Compared with the production of waferboard and OSB, the cost of wood for kraft pulp relative to the selling price of the finished product is lowest.

Table 2.—Conversion return analysis for kraft pulp, oriented strand board, and waferboard

Industry year unit cost	Kraft pulp 1980	Oriented strand board (7/16-inch) 1980	Waferboard (7/16-inch) 1980
	Dollars/Adt	*Dollars/thousand ft²*	
(1) Conversion cost	(195.40)[a]	(93.04)	(88.70)
(2) Return to capital	(131.00)	(28.37)	(21.07)
(3) Transportation	(42.00)	(8.50)	(15.52)
(4) Total (excluding wood)	(368.40)	(129.91)	(125.29)
(5) Market price (1982)	450.00	165.00	159.00
(6) Total conversion return (amount "available" to purchase wood, 1982)	81.60	35.09	33.71
(7) Conversion return per ton of wood[b]	21.09	17.55	18.73
(8) Cost of product, delivered (excluding wood)	(368.40)	(129.91)	(125.29)
(9) Current wood cost	(73.53)	(38.00)	(34.20)
(10) "Break-even"	(441.93)	(167.91)	(159.49)
(11) Current product price	450.00	165.00	159.00
(12) Differential	8.07	(2.91)	(.49)

[a] Parentheses indicate a cost or negative entry.

[b] Green tons of wood required for thousand ft² (7/16-inch basis) of oriented strand board, 2.0;
M ft² (7/16-inch basis) of waferboard, 1.8; Adt of kraft pulp, 3.87.

The kraft pulp process not only has a higher conversion return but also is more flexible in the kind and form of wood it can use. The kraft pulp producer can purchase roundwood, whole-tree chips, or mill residues. If there is a reduction in sawmill residue in northern New England and New York, the pulp mill can use more roundwood. If the logging industry becomes more mechanized, the pulp mill can use whole-tree chips. Because of the higher level of investment in the kraft pulp mill, there is a stronger financial incentive to pay a higher price for wood to keep the investment operating.

In Table 2, lines 8 through 12, the "break-even" price of the three products is estimated. The estimate is based on current wood cost of $19 per green ton. Line 12 is the difference between the break-even price, line 10, and the current product price, line 11. The current price for waferboard and OSB is approximately the break-even price. The current price for kraft pulp exceeds slightly the break-even price.

An economic assessment of waferboard production in Canada concluded that the manufacture of waferboard is not economical given existing market conditions (Schuler and Sastry 1982). A depressed housing market is one of the reasons for the marginal conversion return value for the waferboard and OSB industries. It is evident from the analysis that the production of reconstituted board products would be sensitive to an increase in wood costs. However, it also is likely that an improvement in the housing industry could improve conversion return prospects in the reconstituted board industries.

It also is evident from the analysis that a small improvement in roundwood utilization, say 10 percent, in the manufacture of OSB could give the industry a very favorable conversion return. And an improvement in roundwood utilization is very likely.

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Susan B. Remington is a forester and Paul E. Sendak is a forest economist and Project Leader with the USDA Forest Service, Northeastern Forest Experiment Station, Burlington, Vermont.

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