

Engineered and Other Wood Products – An Opportunity to “Grow the Pie”



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Abstract

The market for engineered wood products (EWP) is being driven by a number of factors including: technology; reduced availability of old-growth timber; construction activity; and globalization. Specifically, technological developments have allowed the industry to “engineer” or “design” improved performance properties and to utilize former “weed species”; environmental concerns have all but eliminated the availability of old-growth timber, and this has contributed to a decline in performance/serviceability of sawn lumber and plywood (Guss 2003).

The key driver for EWP is construction markets, specifically, single-family residential construction. For example, in 2001, single-family construction consumed 27 percent of the softwood plywood; 57 percent of the oriented strandboard; 36 percent of the softwood lumber; 73 percent of the I-joists; 75

percent of the laminated veneer lumber (excluding volume used in I-joists flanges); and 57 percent of the glulam consumed in the United States (APA 2002). Builders in North America, however, are facing some challenging issues – good and bad – related to demographic trends. Labor shortages, particularly skilled labor, will continue for the rest of this decade. On the positive side, favorable demographics will help push the annual demand for housing to almost 2 million units (conventional plus HUD code) for the rest of this decade. To deal with these issues (and other challenges like construction site waste), builders are consolidating into larger companies and industrializing the construction site. This means more of the house is being built in a factory with engineered components, such as trusses, panelized wall systems, and I-joists, built under factory-controlled conditions, which are then shipped to the construction site for assembly.

Current EWP capacity exceeds demand, and this comes at a time when imports are threatening to gain a larger market share and practical steel and concrete home construction methods are emerging (APA 2002). The need for research and development to create new products that satisfy both old and new customers has never been greater. The good news is that EWP, with their superior performance properties and efficient use of wood fiber, are well positioned to evolve and capture new markets in the future.

Introduction

Residential construction (new housing and remodeling) is the key market for North American wood products, accounting for approximately 70 percent of structural panels and softwood lumber consumption (Fig. 1). Although the focus of this paper is structural softwood markets, we should mention that housing markets are also indirectly responsible for much of the demand for hardwoods and for nonstructural composite products such as medium density fiberboard (MDF) and particleboard, if we consider derived demand for furniture, kitchen cabinets, paneling, and the like. Even engineered wood products (EWP) are heavily concentrated in residential construction with single-family housing consuming almost 80 percent of the I-joists and laminated veneer lumber (LVL), and approximately 60 percent of the oriented strandboard (OSB) and glu-

lam (APA 2002). There are important issues facing this industry:

1. judging from recent price trends, some of the markets are oversupplied;
2. key products, lumber and plywood, are mature, hence they are susceptible to substitution from other wood products such as EWP, non-wood products such as steel and concrete, and imports;
3. the key customer, the housing industry, is in transition, driven by demographic forces and globalization trends that are impacting its cost structure.

Furthermore, the United States is losing traditional panel and lumber export markets in Europe as that region becomes more self-sufficient. The United States has lost lumber and plywood markets in Japan to competitors from Europe and Oceania. Europe is now exporting structural lumber and OSB to the United States. Sooner or later, Russia, with the world's largest standing inventory of softwood sawtimber, will emerge as a formidable player in international softwood trade.

Looking more closely at housing fundamentals, demographic forces are providing a foundation for the continuation of a very vibrant and healthy housing market. Demand for housing in the decade ahead, in terms of square feet floor area, will match or even eclipse records set recently, as homes continue to get bigger, single-family shares stay high, baby boomers

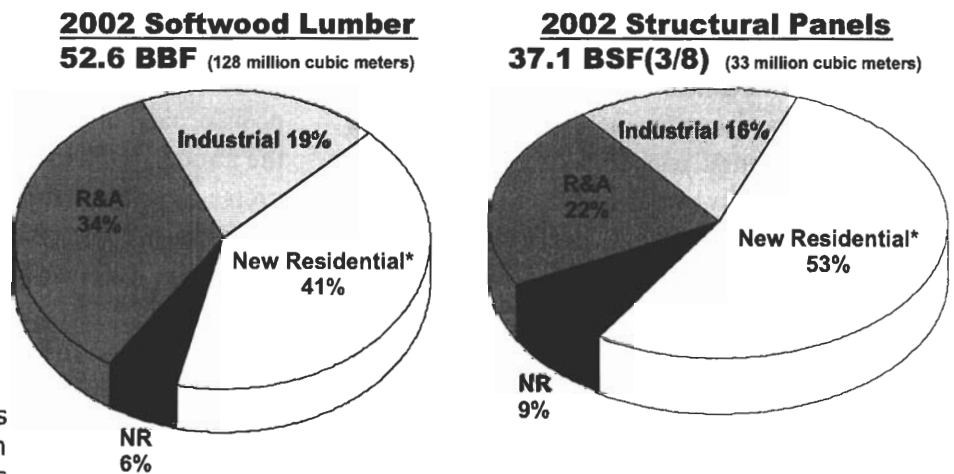


Figure 1.—United States wood products consumption (APA 2002). Too many eggs in the residential basket?

*New Residential including single family, multiple family, and mobile homes.

Big increase in non-CDN Imports + Increase in CDN Imports
 + Increase in EWP's + Fewer lumber and log offshore exports
 + more efficient construction techniques = oversupply despite booming housing markets

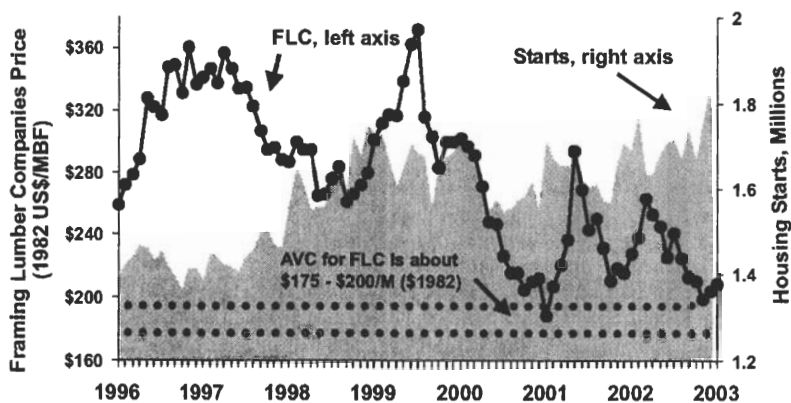


Figure 2.—The lumber glut continues despite housing boom (Random Length 2003; RISI 2002).

Prices slid 45% between 1994 and 1997, and 39% between 1999 and 2002 despite relatively robust housing markets.
 When will prices firm again??

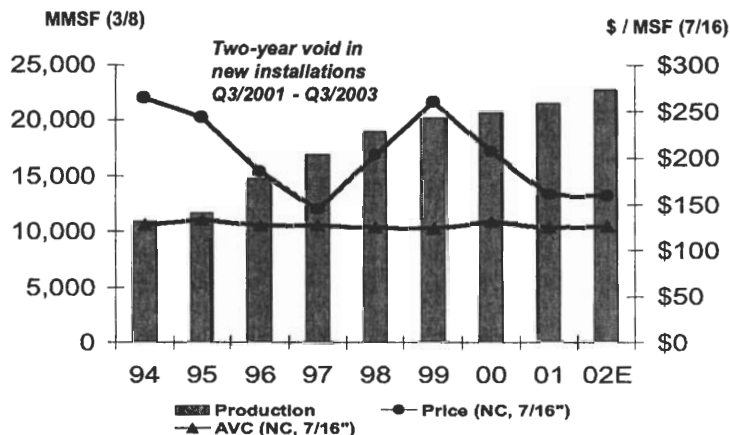


Figure 3.—Overcapacity in OSB markets (APA 2002; RISI 2002).

buy second homes for retirement, and immigration supports strong household formation. However, despite this rosy prognosis, the wood products industry has too many eggs in one basket, and other domestic building material industries such as concrete and steel, as well as foreign producers, are looking at that basket, which makes our wood products industry vulnerable. The authors believe the industry must realize it has competition in key markets, and it must diversify. Some opportunities exist in North America – nonresidential building construction and non-structural applications. One can look at wood use in Europe and Japan for clues in nonstructural applications in addition to analyzing international trade

flows for potential opportunities. Maybe the industry needs to adopt new business models/paradigms to make them more competitive? And last, but not least, the industry must do a better job of promoting consumption of wood products in North America.

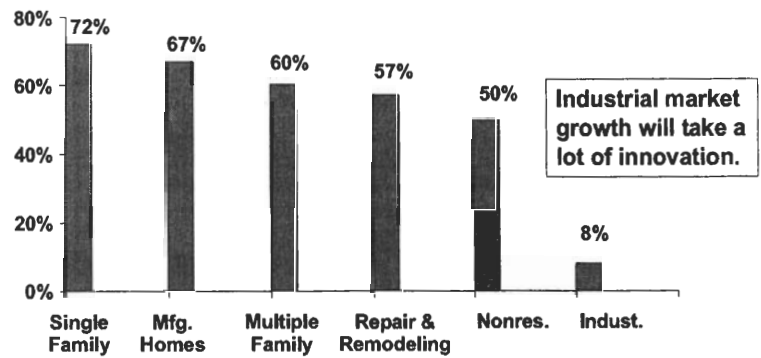
Too Many Eggs in One Oversupplied Basket

One only has to look at lumber and OSB prices to see evidence of oversupply today (Figs. 2 and 3). Some reasons are:

- Canada produced a record 30 BBF of softwood lumber in 2002;
- we saw significant increase in European lumber delivered to the U.S. Southeast in recent years;

OSB should continue to grow – at a slower rate than in the past simply because it now has such a large share of most markets.

OSB share compared to plywood in 2001



APA estimates based on a variety of end use market studies.

Figure 4.—OSB trends – markets getting saturated.

- log and lumber exports are way down from historical highs;
- international panel exports are less than one-half of what they were in the mid-1990s; and
- EWP saw production records in 2002.

EWP prices are also impacted by oversupply in commodity markets via substitution. For example, as 2x10 prices fell in 2002, some builders switched back to large dimension lumber floor systems from I-joists in engineered floor systems. To compete and hold market share, EWP prices had to come down. Further evidence of concentration can be seen in **Figure 4**, which shows that existing markets for OSB are becoming saturated. There are opportunities for OSB in “new markets”, including exterior siding, lumber framing, furniture frames, molding/millwork, and other applications, but we probably will not get there with existing products (**Table 1**). We need more R&D.

Substitution Pressures

Exacerbating the industry’s problems is the fact that the life cycle for some key products are either mature or in decline (**Fig. 5**). EWP will certainly help open new markets, but, currently, they represent only about 5 percent of structural lumber supply, and even some EWP are maturing (**Fig. 6**). As products mature, they become more susceptible to substitution pressures and wood products are no exception. During the past decade, softwood lumber has lost over 8

Table 1.—Potential markets for OSB (Schuler and Adair 2001).

Market	Potential for OSB	
	Total potential	Realistic potential
Exterior siding	11 BSF (SM) 5 to 7 years	1.2 BSF (10% non-wood and 15% of wood)
Lumber framing	27 BSF (3/8 in.) 5 to 10 years.	1.5 BSF (5% of total)
Furniture frames	1.2 BSF (3/8 in.) 4 to 5 years	0.4 BSF (33% of remainder)
Molding/millwork	4.4 BSF (3/8 in.) 4 to 5 years	0.7 BSF (15% of total)
Non res. buildings	6.0 BSF (3/8 in.) 4 to 5 years	0.6 BSF (take 10% from steel)
Total	49.6 BSF (SM)	4.4 BSF (SM)

BBF of its markets to EWP, steel, and plastic in both structural and nonstructural applications (**Fig. 7**).

Transition in Residential Construction

The homebuilding industry is facing some important issues that are forcing them to consider changing the way they build houses. The main driver is demographics, and it is having both positive and negative impacts. On the positive side is that demographic forces will support strong housing demand for the next decade. A strong and growing immigrant population, including first generation immigrants, and wealthy aging baby boomers buying vacation and re-

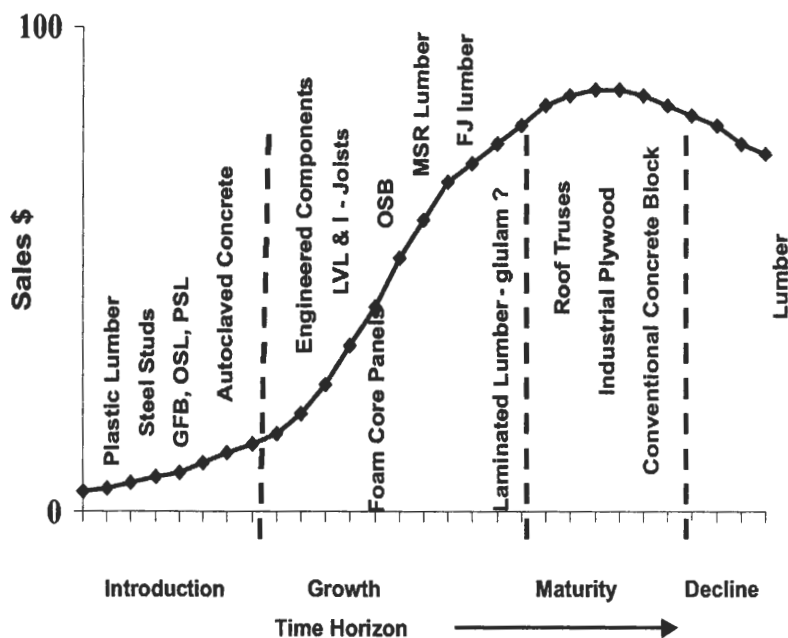


Figure 5.—Construction product life cycle. Alternatives to conventional wood products, lumber and plywood, are expected to continue losing market share to materials which require less maintenance, are stronger, and have more predictable performance.

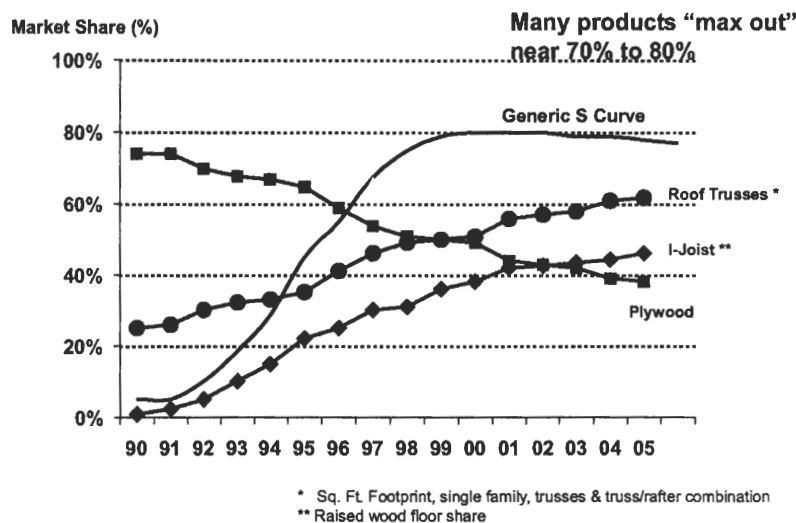


Figure 6.—Life cycles of EWP. Some EWP are becoming commodities.

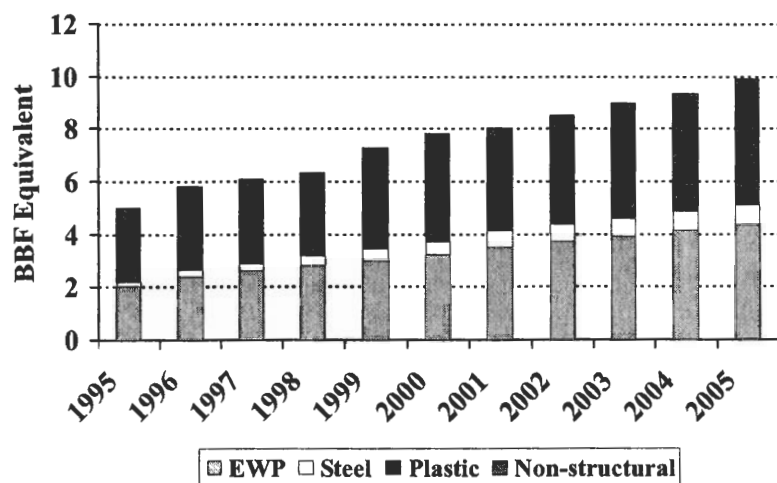


Figure 7.—Softwood lumber substitutes (Taylor 2001).

Table 2.—Trends in homebuilding methods (APA 2002).

	1997		2001	
	# units	%	# units	%
Stick built ^a	1,175	79.7	1,100	68.6
Panelized ^b	105	7.1	240	15.0
Concrete ^c	125	8.6	197	12.3
Modular ^d	45	3.1	33	2.0
Steel frame ^e	8	0.5	13	0.8
SIPs ^f	8	0.5	11	0.7
Other ^g	8	0.5	9	0.6
Total	1,474	100	1,603	100

^a Stick build walls and floor mostly prefab roof trusses.

^b Panelized wood walls built in factory and then delivered to the jobsite.

^c Block, poured concrete, or solid brick walls.

^d Factory built modules (not HUD).

^e Steel framing used for at least exterior walls.

^f Structural insulated panels (foam core with structural panels).

^g Log homes, post and beam, rammed earth, etc.

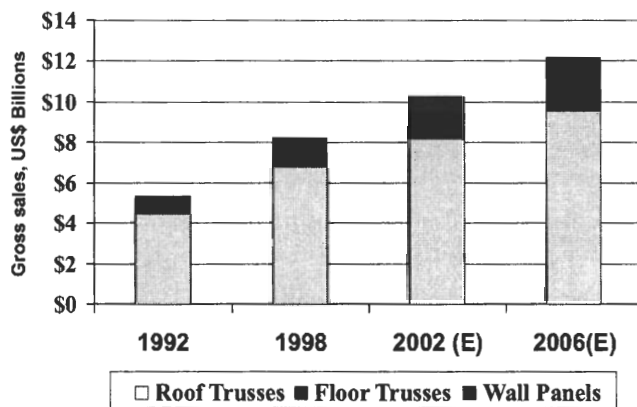


Figure 8.—Lumber component industry growth (Grundahl 2001). The industry is moving toward components that are made in a factory and delivered to the job site. Precision cut, no waste.

tiement homes will help drive household formations and therefore, housing demand. On the negative side, those same demographic trends suggest that the current labor shortage will get worse and that means labor intensive industries like housing (and furniture) will be forced to find ways to reduce labor content (Table 2 and Figs. 8 and 9). With housing, this means industrialization or greater use of components such as engi-

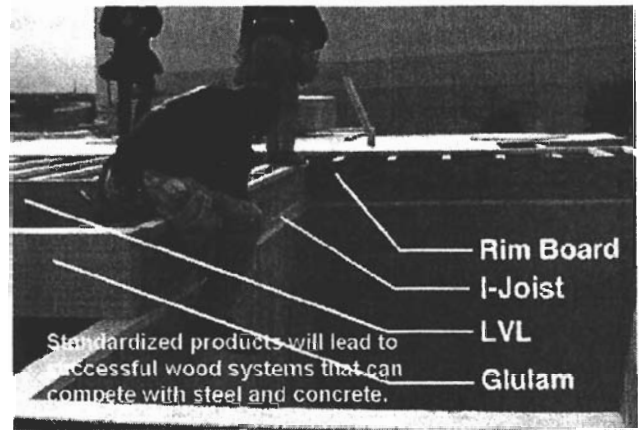


Figure 9.—Engineered floor system.

neered floor systems, LVL headers, panelized wall systems, roof trusses, and maybe SIPs (structural insulated panels). The industrialization process is expected to speed up as the homebuilding industry consolidates to take advantage of economies of scale and the perceived need to become national builders who can tap into customer/brand loyalty themes (sell starter home, move up homes, and retirement home to the same customer). According to the latest Builder 100 survey, the top 100-market share (homes closed by largest builders) is now 35 percent, compared with less than 20 percent a decade ago.

EWP Outlook

The outlook for EWP is good, but these products suffer from some of the same problems facing other wood products - namely too much concentration in residential markets (Fig. 10). Both LVL and I-joist demand is expected to slow down in the next 4 to 5 years simply because existing markets are becoming saturated (Figs. 11, 12, and 13). Even North American glulam demand is 65 percent residential applications whereas in Europe, which consumes more glulam than North American, demand is growing more rapidly by focusing on nonresidential construction. There is no question that EWP will continue to grow - they now represent about 5 percent of structural lumber demand, but most of the growth is at the expense of conventional lumber products—cannibalizing 2x10s and other large dimension lumber products. This is a similar scenario to OSB capturing mar-

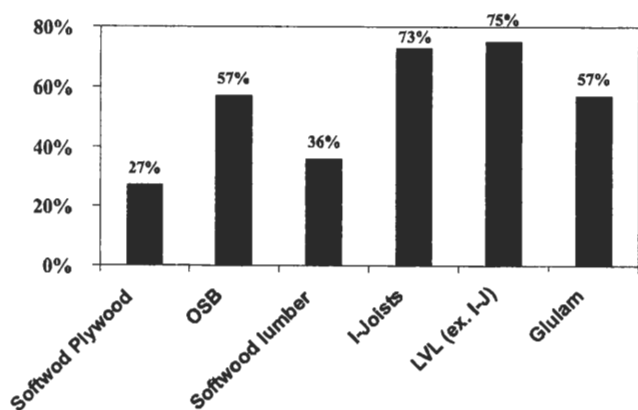


Figure 10.—Engineered wood products consumption in single-family housing (APA 2002).

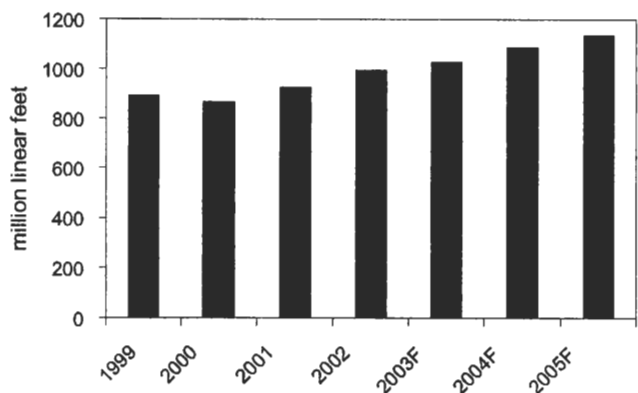


Figure 11.—North American I-joist production forecast (APA 2002). Residential floors account for nearly 80% of usage. The market is maturing with additional growth among smaller builders. A variety of flange material is used depending on the application.

ketshare from plywood, after plywood took sheathing markets from lumber boards. An example of how EWP could further “cannibalize” lumber markets is potential for OSL (oriented strand lumber) in capturing a share of the lumber framing market (Table 3).

“Grow the Pie”

The authors suggest that now is a good a time to consider “growing the pie”, or finding new and innovative markets for wood products outside of residential construction. There are alternatives to residential construction. Nonresidential building construction

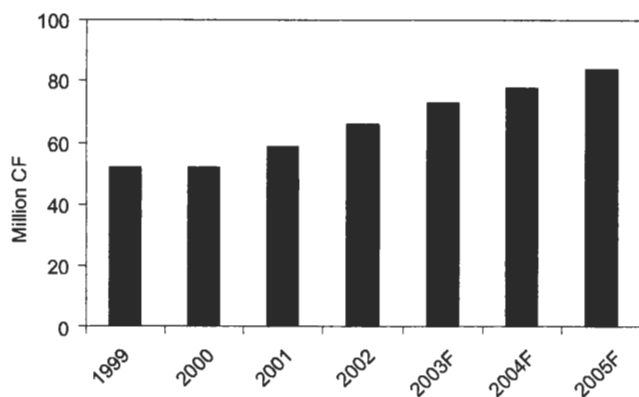


Figure 12.—North American LVL production forecast (APA 2002). Residential construction is the primary use: 50% in flanges and 43% in headers and beams. Most growth will be in header and beam use.



I-Joists

80% Res. floors

11% Nonres.

5% Remodel.

4% Roofs, walls

100%

LVL

50% I-Joists

43% Header/Beam

5% Industrial

2% Rim board

100%

Figure 13.—Residential concentration of I-joists and LVL (APA 2002).

in North America is almost as large as the residential sector in terms of value of construction. Non-structural or appearance markets offer significant opportunities as evidenced by such applications in Europe and Japan. Another source of ideas/opportunities comes from an analysis of import/export statistics. The United States is losing the international trade battle in wood products, and the logical ques-

Table 3.—OSL opportunities in lumber framing.

Big Market — Total U.S. framing market about 12.6 BBF
= 33 BSF (3/8 in.)
= 2.0 billion cubic feet
= 29 million cubic meters

Oriented strand lumber can substitute for framing/stud lumber and long lengths. Also, interior non-load bearing walls where dimensional stability is critical (e.g., kitchen walls where cabinets are hung).

Just 1% of the framing market = 330 MSF (3/8 in.) or 20 million cubic feet or 290,000 cubic meters. This is equivalent to 1 OSB mills or one-third of the current LVL production.

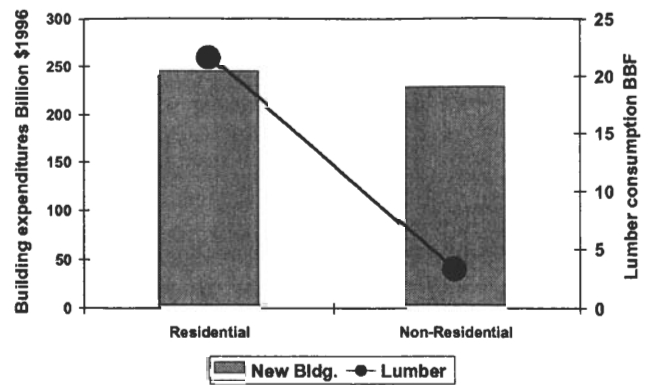


Figure 14.—2002 U.S. new building construction expenditures versus lumber consumption (U.S. Census 2002; RISI 2002).

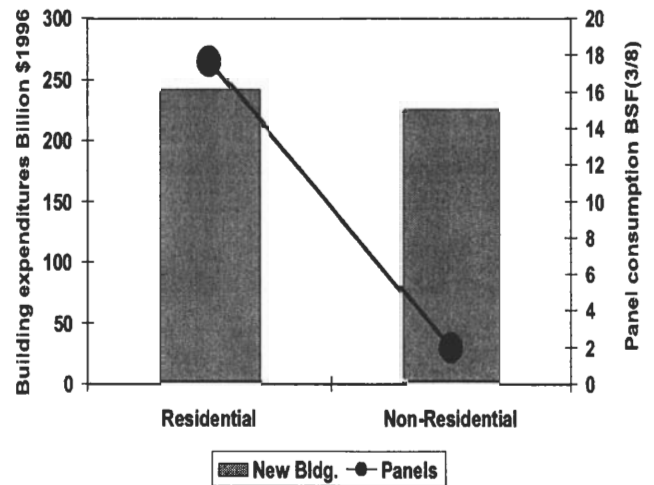


Figure 15.—2002 new building construction expenditures versus structural panel consumption (U.S. Census 2002; RISI 2002).

tion is — are we missing some opportunities? And last but not least, we need to reexamine our promotion efforts. Contrary to popular belief, most wood products don't sell themselves; furthermore, we need to remember that we have competition.

We need R&D to create new and innovative products that satisfy both old and new customers. The good news is that EWP, with superior performance properties, efficient use of wood fiber in its manufacture, and international trends in building codes, are well positioned to evolve and capture new markets in nonresidential and nonstructural end uses in North America and international markets.

Nonresidential Building Construction Opportunities

There are real opportunities when one considers the following observations: expenditures on nonresidential buildings are almost equal to residential expenditures, yet we have a very small market share (Figs. 14 and 15). Opportunities for OSB are enormous — a recent WPC study suggests a 6 BSF (3/8 in.) potential assuming steel and concrete are replaced by wood where allowed by the codes. But, we have to do our homework to penetrate this market — we have to make architects and engineers feel more comfortable with wood; we have to reduce variability of performance properties; we need to promote wood systems; and we need a more coordinated promotion effort. EWP have a real advantage in going after nonresidential markets — predictable performance *vis-a-vis* conventional wood products plus the worldwide adoption of performance-based building codes.

Nonstructural Opportunities

We can look toward Europe and Japan for clues regarding opportunities in appearance markets such as furniture, molding/millwork, paneling, flooring, etc. Europe consumes over 100 million cubic meters (42 BBF) of sawnwood (hardwood and softwood lumber) annually, despite building 90 percent of their homes using steel or concrete framing. North America consumed 180 million cubic meters (77 BBF), much of it due to the fact that 90 percent of our houses are wood framed. With respect to EWP, Europe consumes large amounts of glulam while Japan

Table 4.—Solid wood^a trade balance (USDA 2002).

How to identify markets for wood products? Look at international trade flows Import/export statistics for 1990s suggest loss of competitive position????			
Year	Export	Import	Balance
1986	3,044	4,504	(1,460)
1989	5,315	5,253	62
1996	7,279	11,596	(4,317)
2001	5,141	15,094	(9,952)

^a U.S. solid wood includes logs, chips, lumber, flooring, etc. but excludes furniture (million dollars).

consumes large amounts of LVL, much of it in nonstructural applications.

Look at Trade Flows for Opportunities

The United States appears to be losing the international battle for wood product markets. Our trade balance worsens each year, not only with solid wood products (Table 4), but also with manufactured products such as furniture. The trade imbalance last year for wood household furniture reached \$7 billion, up from less than \$2 billion a decade ago (Schuler and Buehlmann 2003). One problem may be the lack of R&D. Last year, the entire forest products industry in the United States spent less than \$2 billion on forest products R&D (Gaston 2002). Yet, some companies spend more than the entire forest products industry. For example, last year Merck spent \$2.5 billion on R&D; Intel spent \$3.76 billion; IBM spent \$5.29 billion; Pfizer spent \$4.35 billion. Table 5 shows an interesting correlation between R&D and trade balances – those industries that spend more on R&D generally have more favorable trade balances.

Need to Promote Wood Products

In the past, the wood products industry did not need to market itself because it was viewed as a logical construction necessity, but that perception is facing serious challenges (Gleason 2001). The industry needs to realize it has competition, and it needs to promote itself. Promotion works as evidenced by the fact that Finland has doubled per capita consumption of wood products through a decade long cooperative promotion effort involving primary manufac-

Table 5.—Trade balances versus R&D expenditures.

Trade balances: Industries that spend more on capital improvements (R&D) generally have more favorable balances – 2002 basis		
Industry	CAPEX/ shipments ^a	Trade balance
	(%)	(\$)
Wood HH furniture	2.1	–7.0 billion
Solid wood products	<1	–10.0 billion
Synthetic rubber	6.5	+0.3 billion
Plastics and resins	6.5	+6.2 billion
Automotive parts	5.0	+1 billion
Commercial printing	4.4	+0.4 billion
Agric. chemicals	4.6	+2.8 billion
Industrial chemicals	8.4	+1 billion
Telephone equipment	3.3	+3 billion
Aircraft parts	5.2	+10 billion

^a Total capital expenditures divided by value of shipments for latest year available.

turers, distributors, and associations (Fig. 16). We have promotion programs in the United States, but they have not been as successful to date – we need to determine why. A good example of a recent promotion program with potential is WPC's "Woodworks–USA" effort to increase wood use in nonresidential construction.

Summary and Conclusions

Residential construction (new housing plus remodeling) is the key market for North American wood products, accounting for approximately 70 percent of structural panels and softwood lumber consumption. Even EWP are heavily concentrated in residential construction with single-family housing consuming most of the I-joists and LVL, and over half of the OSB and glulam. There are important issues facing this market:

1. they are oversupplied and with the oncoming glut of timber in the world, commodity prices will suffer;
2. key products are mature, hence they are susceptible to substitution from other wood products such as EWP, non-wood products such as steel and concrete, and imports;

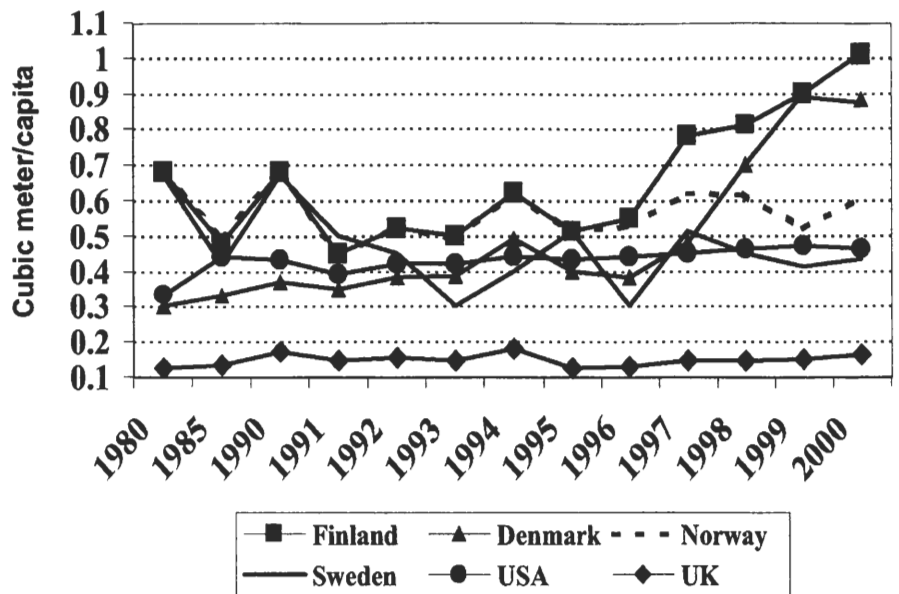


Figure 16.—Sawn softwood per capita consumption (UNECO/FAO 2003). The Finns doubled per capita consumption in the past decade; can the United States do the same? (Consumption = production + imports – exports.)

3. the key customer, the housing industry, is in transition, and is changing the way they build homes.

Furthermore, the United States is losing the battle for international trade in wood products (Table 4). In essence, we have too many eggs in one basket – residential construction – and other players/competitors, both domestic and offshore, are looking at that basket as a potential home for some of their surplus capacity in steel, concrete, and wood products.

The authors suggest that now is as good a time as ever to consider “growing the pie”. There are alternatives to residential construction – nonresidential building construction in North America; nonstructural or appearance markets offer significant opportunities; another opportunity comes from an analysis of import/export statistics. Why are we losing the international trade battle in wood products? And last but not least, we need to reexamine our promotion efforts. Contrary to popular belief, most wood products don’t sell themselves; furthermore, we need to remember that we have formidable competition.

Finally, we need R&D to create new and innovative products that cut across boundaries and satisfy both old and new customers. The good news is that EWP, with superior performance properties, efficient use of wood fiber in its manufacture, and international

trends in building codes, are well positioned to evolve and capture new markets in nonresidential and nonstructural end uses in North America and international markets.

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