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"Some people regard private enterprise as a predatory tiger to be shot. Others look on it as a cow they can milk. Not enough people see it as a healthy horse, pulling a sturdy wagon."

Winston Churchill

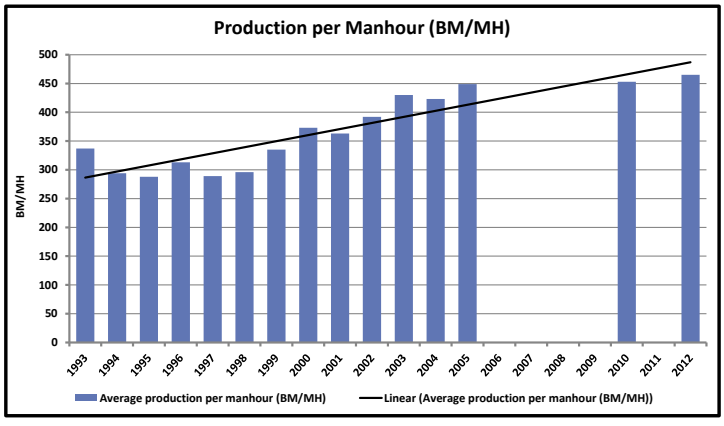
Forest Products News

The Beck Group

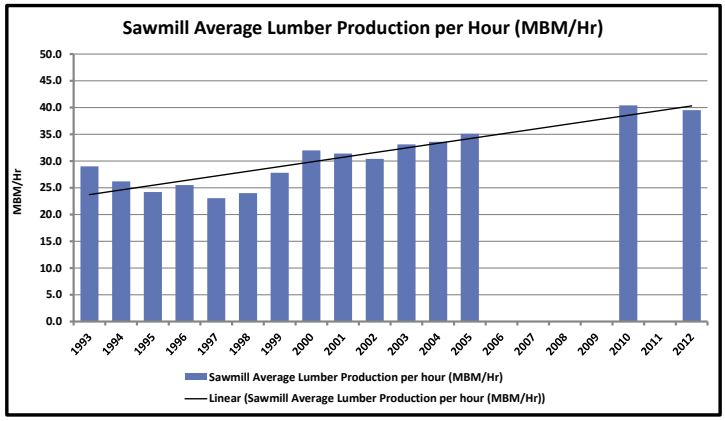
SYP Sawmill Productivity, Recovery Gains Offset Inflation

Since the Beck Group conducted its first Southern Yellow Pine (SYP) benchmarking study in 1993, we have been performing studies nearly every year except for a four year period during the major economic downturn of 2006-2009. Our most recent SYP study covered calendar year 2012, and we recently compiled our data from that nearly 20 year time period to assess how production per man hour, sawmill production per hour, and lumber recovery have changed in the SYP region.

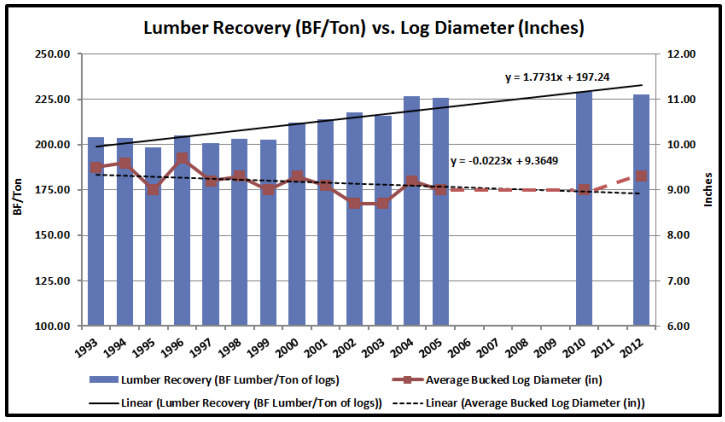
Regarding ***production per man hour*** (BM/MH), the following chart illustrates the board feet of lumber produced per man hour over time, where man hours are based on all hourly employees working in operations. The average has increased from about 300 board feet per man hour to more than 450 board feet per man hour – an average improvement of about 3.5% per year.



Similarly, BECK tracked the change in ***sawmill average lumber production per hour*** (MBM/Hr) over the same period. As the following chart illustrates, the average MBM/Hr has increased from about 25,000 in 1993 to approximately 40,000 in 2012. Like BM/MH, this represents an average improvement of about 3.5% per year.



BECK also assessed the change in ***lumber recovery*** (or yield). In other words, the volume of lumber produced per ton of log usage. This metric is heavily influenced by average log diameter, with larger logs requiring fewer tons to yield 1,000 board feet of lumber. Thus, in addition to showing the change in lumber recovery, the following chart also shows how the average bucked log small end diameter has changed over time. The chart indicates that the average bucked log diameter has decreased slightly – from about 9.5" in 1993 to about 9.0" in 2012. Despite this drift toward smaller logs,



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CAWBIOM

With funding from the U.S. Forest Service, The Beck Group completed a study for the National Forest Foundation aimed at identifying ways to increase the pace and scale of forest restoration in California forests. Several reports from the study, titled California Assessment of Woody Business Innovation Opportunities and Markets (CAWBIOM), are available here.

BECK completed the project in two phases. In Phase I, we identified nearly 50 technologies for utilizing various forms of woody biomass. We also developed a technology screening matrix as a tool for objectively ranking the technologies in order of their likelihood for being developed into viable businesses. Examples of the screens used include: market attractiveness, scale, commercial readiness, degree of innovativeness, ability of equipment vendors to provide guarantees of performance and environmental compliance.

In Phase II, BECK completed detailed feasibility assessments for four technologies: Oriented Strand Board, Small Scale Biomass Cogeneration, Cross Laminated Timber, and Veneer manufacturing. The feasibility analyses included supply studies, estimation of capital and operating costs, permitting and regulatory issues, site identification, and financial analysis of the return on investment. BECK found that each of the four businesses could likely be feasible. However, there are still key unanswered questions associated with each. For example, for OSB obtaining the required air quality permits is a key factor as well as more definitively identifying the sources of raw material. Similarly, CLT manufacturing appears viable, but a key question is the rate at which the market for this innovative product will develop. BECK is pursuing funding to continue planning development of these businesses.

Throughout the project, BECK worked with a multi-stakeholder steering committee to assure the effort aligned with project objectives.

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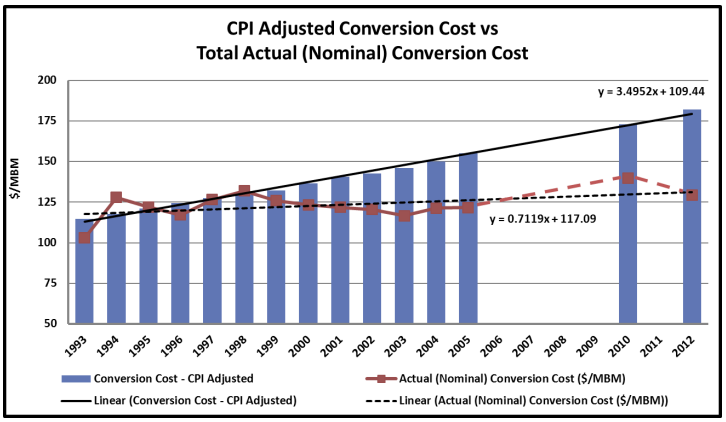
SYP Sawmill Productivity, Recovery continued)

which negatively affects yield, the clear trend in lumber recovery is more board feet per ton over time. The annual improvement was about 0.9%. Note also that smaller log sizes negatively impact productivity, but as illustrated in the prior productivity charts, the sawmills have overcome decreasing log size to achieve productivity gains.

The final chart compares inflation adjusted total conversion cost (the purple bars) to the actual (nominal) total conversion cost (the red line). Note that the total conversion cost includes all manufacturing costs except for logs (i.e., labor, power, supplies, etc.) Both costs are expressed in $/MBM. As the chart illustrates, the actual conversion cost remains almost flat over time, which means that mills have been able to offset costs one would expect from inflation by making continuous improvements in productivity and recovery.

The improvements have been achieved through a combination of capital expenditures and management initiatives focused on improving performance. For example, productivity gains were achieved by eliminating recurring bottlenecks, improving "flow" at key points in the operation, reducing downtime, quality training and supervision of employees, employee incentive payments, minor process control improvements, etc.



Similarly, yield improvements have been achieved by maintaining scanning and optimization systems (i.e., regular accuracy checks); reducing lumber target sizes and saw kerfs; training and supervision of employees regarding best yield practices; improved lumber drying practices to reduce trim loss, etc. In other words, ***good, effective management is able to continually improve operating results, even without major capital expenditures.***

BECK Projects Update

BECK staffers have been busy completing a variety of projects; a few highlights are described below.

Beck Group—Mill Management Workshop Update

Under Development

Southern U.S. Sawmill Management Training—The Beck Group is in the early stages of organizing a sawmill management training workshop in the Southeastern U.S. An exact date and location are still to be determined, but we are currently considering a workshop in Alabama in the fall of 2016. Please contact us if you are interested in attending.

Customized Management Training—BECK has been developing a customized management training program for a major North American lumber producer. The educational information will be delivered to the company's sawmill supervisors and superintendents at a variety of locations in the U.S. and Canada.

Recently Completed

Plywood/Veneer Management Training—The Beck Group completed its first ever plywood/veneer management training workshop in Portland, OR at the end of March. Nearly 30 industry representatives attended the 3-day event. A combination of BECK staff and industry experts provided training to mill managers, supervisors, and superintendents on a variety of plywood/veneer topics.

Sawmilling 101—BECK delivered a one-day sawmilling 101 workshop to over 50 attendees in Coeur D'Alene, Idaho in early February. This annual workshop is targeted to those who are interested in learning more about sawmilling, but are not involved in the day-to-day operation.

Other Beck Group Project Activities

Western U.S. Mill Residual Supply and Demand— Supply, demand, and pricing of mill residuals in the western U.S. continues to be an area of interest for a variety of clients. In response, BECK has developed a database of mill residue producers and mill residue consumers and their production and consumption of mill residues. This information is useful for those interested in utilizing these materials and those involved in selling these materials.

Biomass District Heating—BECK recently completed a study for the Spokane Tribe that involved a high level feasibility assessment for creating a biomass fueled district heating system for various buildings in Wellpinit, WA. The tribe is currently seeking funding to complete additional planning and analysis for the project.

Eastern Oregon Small Diameter Wood Study—BECK was retained by the Oregon Department of Forestry to quantify the supply and characteristics of small diameter trees in Eastern Oregon and to review utilization options for small diameter trees. BECK presented the study findings to the Oregon Board of Forestry and the report is available here.

Recovery Gains—BECK worked with a client to summarize and analyze recovery data from over two decades of benchmarking studies. A key objective of the effort was to trace how yield and recovery factors have changed among top quartile operations over time for western sawmills, southern sawmills, veneer/plywood plants, and Oriented Strand Board operations.

Softwood Sawmilling Overview—BECK provided a high-level overview of softwood sawmilling in the U.S. West and U.S. South for a financial services organization that specializes in serving natural resources based industries. Topics covered included a comparison of lumber producing regions, recent financial performance among regions, and key characteristics of top performing operations.

Historic Saw Log Demand—BECK worked with a confidential client to estimate historic saw log consumption in the client's region of interest. BECK used historic lumber and plywood/veneer production volumes for the region, a database of sawmill and veneer/plywood plants in the area, and assumptions about the plants' yields in converting logs to lumber/veneer to estimate the demand for saw logs in the area. The period of interest covered 10 years, broke out saw log demand by species, and indicated certain time periods when logs were in either excess supply or deficit.

THE BECK GROUP

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Lumber Supply for CLT Manufacturing

Forest Business Network recently hosted the Mass Timber Conference in Portland, Oregon. Attendees included a mix of forest industry professionals, architects, engineers, government agency personnel, and real estate developers. Excitement was high as more than 500 attendees learned about the prospects for using CLT technology to develop multi-story commercial and residential buildings.

Roy Anderson, Vice President of The Beck Group, spoke at the conference about the supply of lumber for CLT manufacturing. The following table illustrates one of the presentation's key points ─ lumber is estimated to be just over 50 percent of CLT's total cost of manufacturing, which is high relative to most of the other technologies shown. This suggests that effective CLT manufacturing will involve management's close attention to control of lumber costs.

Cost Category	Sawmill	CLT	Ply	OSB	PB	MDF
Wood (%)	66	52	45	30	21	16
Glue (%)	0	11	7	20	24	24
Labor (%)	9	8	23	8	12	8
Supplies (%)	7	4	7	9	8	9
Repairs & Maint. (%)	4	2	4	4	5	4
Utilities (%)	3	3	5	6	10	17
Mgmt. Salaries (%)	3	5	2	7	6	5
SG&A (%)	7	16	7	17	14	17
Total (%)	**100**	**100**	**100**	**100**	**100**	**100**

Another key presentation point is that a large CLT manufacturer would use an estimated 24 million board feet of lumber per year. To put that volume into perspective, softwood lumber produced in the U.S. and Canada has been as high as 75 billion board feet per year, and in 2015, was well over 55 billion board feet. In other words, a large CLT plant would consume far less than 1/10 of one percent of North American annual production. This implies that lumber should be readily available to a CLT plant. However, the ANSI/APA PRG 320-2012 specifications for lumber used in CLT manufacturing define the species, thicknesses, and grades of lumber that can be used. These factors quickly reduce the volume of lumber suitable for use as CLT material.

In addition, there are manufacturing efficiency considerations. Portions of the CLT manufacturing process are linear, so there is a strong incentive to use wide pieces of lumber, which lowers piece counts and increases productivity. However, historically, there has been a $40 to $70 per MBF price premium on wide lumber, which offsets potential efficiency gains. Finally, CLT lumber has to be dried to a lower moisture content than current industry standards for dimension lumber. Since dry kilns are often a production capacity bottleneck at sawmills, the willingness of the mills to tie up drying capacity for drying CLT stock to a lower moisture content is unknown.

The conclusion concerning these preceding factors is that, in BECK's opinion, a large CLT manufacturer will need to carefully vet locations before selecting a site located close to several relatively large nearby sawmills.