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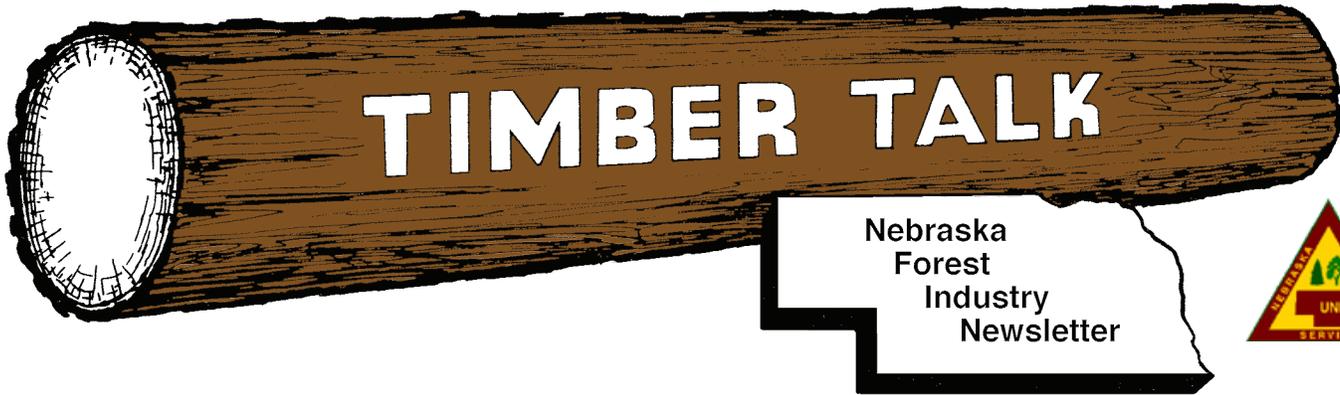
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NEBRASKA FOREST SERVICE



Nebraska Forest Service

Institute of Agriculture and Natural Resources

University of Nebraska–Lincoln

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Lumber Market

HARDWOODS

Northern. In general, orders and shipment have held up well. A push back in volume from market slowdowns has increased sales competition from sources within and outside the region. At the same time, total sawmill output has remained steady. Supplies of most species are adequately positioned for this time of year. Despite the mix of business results and supply status, prices have not been overtly pressured. Seasonal changes to cooler temperatures will relax the stringent restrictions on whitewoods. Additionally, consumer spending trends shift to interior household projects in fall and winter months, which can bolster demand for hardwood fixtures and furnishings.

Appalachian. With a diverse species mix across the region, activity is equally varied. During hot weather months, conditions favor production of non-whitewood species, because of stain. Typically, Red Oak and White Oak output grows. Green lumber supplies are meeting buyers' needs for most items and are exceeding demand for Cherry and Walnut. Domestic and international markets for KD stocks cooled in the second half of the year, but are significantly better than the same time last year.

Southern. The July housing data from U.S. Census Bureau show reason for optimism. Unadjusted year-to-date total and single-family permits are up 31% and 21.5%, respectively. However, housing completion numbers are better indicators of current business: -6.8% in the South, -3.3% in the West, -28.8% Northeast, and +11.8% Midwest. Through the first half of the year, international shipments have increased 9% over the same period in 2011. Domestic demand has stabilized from the first quarter. Ideal drying conditions and slightly higher sawmill production have increased supplies of KD lumber. Few mills indicate any difficulties shipping the full run of green lumber output.

(Source: Condensed from *Hardwood Market Report*, August 24, 2012. For more information or to subscribe to *Hardwood Market Report*, call (901) 767-9216, email: hmr@hmr.com, website: www.hmr.com)



Hardwood Lumber Price Trends—Green

Species	FAS				#1C				#2A			
	6/12	3/12	12/11	9/11	6/12	3/12	12/11	9/11	6/12	3/12	12/11	9/11
Ash	860	845	825	815	625	610	600	580	420	410	410	405
Basswood	715	715	705	705	400	400	375	375	205	205	205	205
Cottonwood	635	635	635	635	435	435	435	435	220	220	220	220
Cherry	1355	1355	1355	1395	655	655	655	655	330	330	330	330
Elm	635	635	635	635	420	420	420	420	245	245	245	245
Hackberry	475	475	475	475	455	455	455	455	265	265	265	265
Hickory	720	700	670	670	595	575	560	560	445	430	415	415
Soft Maple	1115	1020	985	920	675	630	600	585	385	340	340	325
Red Oak	870	835	835	900	585	585	585	640	490	490	490	510
White Oak	1000	1000	1000	1000	600	600	600	625	450	450	450	470
Walnut	1410	2000	2070	2155	965	1015	1075	1160	565	655	705	770

Note: Lumber prices quoted in dollars per MBF, average market prices FOB mill, truckload and greater quantities, 4/4, rough, green, random widths and lengths graded in accordance with NHLA rules. Prices for ash, basswood, northern soft grey elm, unselected soft maple, red oak and white oak from Northern Hardwoods listings. Prices for cottonwood and hackberry from Southern Hardwoods listings. Prices for cherry, hickory and walnut (steam treated) from Appalachian Hardwoods listings. (Source: *Hardwood Market Report Lumber News Letter*, last issue of month indicated. To subscribe to Hardwood Market Report call (901) 767-9126, email: hmr@hmr.com, website: www.hmr.com.)

Hardwood Lumber Price Trends—Kiln Dried

Species	FAS				#1C				#2A			
	6/12	3/12	12/11	9/11	6/12	3/12	12/11	9/11	6/12	3/12	12/11	9/11
Ash	1290	1290	—	—	930	930	—	—	745	745	—	—
Basswood	1060	1060	—	—	650	650	—	—	455	455	—	—
Cottonwood	780	—	—	—	570	530	—	—	—	—	—	—
Cherry	1935	1960	—	—	1065	1065	—	—	670	670	—	—
Elm	—	—	—	—	—	—	—	—	—	—	—	—
Hackberry	—	—	—	—	—	—	—	—	—	—	—	—
Hickory	1275	1275	—	—	1065	1065	—	—	840	840	—	—
Soft Maple	1490	1365	—	—	960	900	—	—	720	670	—	—
Red Oak	1465	1395	—	—	1025	1025	—	—	850	850	—	—
White Oak	1655	1635	—	—	1045	1045	—	—	830	830	—	—
Walnut	2295	3145	—	—	1755	1820	—	—	945	1075	—	—

Note: Kiln dried prices in dollars per MBF, FOB mill, is an estimate of predominant prices for 4/4 lumber measured after kiln drying. Prices for cottonwood and hackberry from Southern Hardwoods listings. Prices for ash, basswood, northern soft grey elm, unselected soft maple, red oak, and white oak from Northern Hardwood listings. Prices for cherry, hickory and walnut (steam treated) from Appalachian Hardwoods listings. (Source: *Hardwood Market Report Lumber News Letter*, last issue of month indicated. To subscribe to Hardwood Market Report call (901) 767-9126, website: www.hmr.com.)

Timber Stumpage Prices

The Nebraska Forest Service does not have a reliable system of collecting data on timber stumpage prices paid for Nebraska timber. Since current timber stumpage price information would be useful to landowners, loggers, sawmills and forester's in Nebraska, timber stumpage price information will be summarized from selected states and periodically presented in Timber Talk. Although this data is not collected from Nebraska timber sales, it may serve as a general guide in tracking stumpage trends. Prices quoted in \$/MBF.

Species	(1) Illinois (Nov. 2010 - Feb. 2011)		(2) Missouri (April - June 2012)	
	Sawtimber	Veneer	Sawtimber	Veneer
Ash	100-210 (160)			
Basswood	100-200 (130)			
Cherry	150-450 (280)	300-1000 (600)	*80-80 (80)	
Cottonwood	50-120 (80)			
Elm	75-120 (100)			
Hackberry	75-120 (100)			
Hickory	100-250 (160)		*40-110 (55)	
Soft Maple	100-250 (130)			
Red Oak	150-300 (230)	150-850 (550)	*30-110 (75)	
White Oak	200-400 (330)	500-1900 (1140)	*40-110 (85)	
Sycamore	100-150 (100)			
Black Walnut	300-1100 (660)	300-5000 (2270)	*425-425 (425)	
Redcedar				

- (1) Source: Illinois Timber Prices. Stumpage price range for Sawtimber reported from the Prairie Unit (Zone 3). Sawtimber price average, in parentheses, and veneer price range and average reported from Statewide statistics. Doyle Scale.
- (2) Source: Missouri Timber Price Trends. Stumpage price range and average, in parentheses, reported from the North Region or Statewide (indicated with *) statistics. International 1/4" Rule.

Wood Is Good

Patrick Moore, *National Post* • Mar. 30, 2011

I believe trees are the answer to many questions about the future of human civilization and the preservation of the environment. Questions like, "What is the most environmentally friendly material for home construction?" "How can we pull carbon dioxide out of the atmosphere and how can we offset the greenhouse gas emissions caused by our excessive use of fossil fuels?" "How can we build healthy soils and keep our air and water clean?" "How can we provide more habitat for wildlife and biodiversity?" "How can we increase literacy and provide sanitary tissue products in developing countries?" "How can we make this earth more green and beautiful?" The answer to all these questions and more is "trees." Trees show us there can be more than one answer to a question, and sometimes the answers seem to contradict one another. But I hope to demonstrate that just because we love trees and recognize their environmental value doesn't mean we shouldn't use them for our own needs.

Over the past 10,000 years we have converted nearly one-third of the world's forests into cities, farms and pastures, the best one-third in terms of fertility and productivity. As long as the planet's human population was reasonably small compared with the vastness of global forests, deforestation remained a very local issue. But as numbers grew and more land was cleared for crops and grazing animals, we began to take our toll on the natural world. During the 18th and 19th centuries, forests of the industrialized European countries were rapidly decimated and wood soon came into short supply.

We began to learn how to farm trees in the same way we

had learned to farm food 10,000 years earlier. The art and science of silviculture, more commonly known as forestry, emerged in central Europe as a way to increase the wood supply to feed the growing demands of industry. Up until about 250 years ago, forests had merely been exploited and the land was either converted to farm land or left to grow back on its own, often with trees not as stately or useful as the ones that preceded them. Now people began to replant harvested areas with new trees of desirable species for timber production. Over the past 200 years the forested area of Europe has tripled from about 10% to about 30%, due almost entirely to the transition from pure exploitation to forest management.

Similar patterns have occurred more recently in China and India, where the demand for wood products from an emerging middle class has resulted in a doubling of forest area in recent decades. During the past 20 years, China has added more new forest than any other country and has adopted an aggressive reforestation program that will continue into the foreseeable future. The forests of Canada, the U.S., Australia, New Zealand, Chile, South Africa and Japan are all stable or growing in area due to the application of sustainable forestry management. And even though there is a net loss of forests in Brazil and Indonesia due to clearing for farming, there is also a major effort afoot to establish sustainable plantation forestry over large areas.

It may seem ironic that with few exceptions the countries that use the most wood have a stable or growing area of forest whereas the countries that use the least wood are losing forest

as more land is cleared for agriculture. There are two reasons for this apparent contradiction. First, the adoption of intensive agricultural practices in the industrialized countries makes it possible to grow much more food on the same amount of land. Second, it is precisely because we use so much wood that the area of forest is maintained. We may think that when we buy wood from a lumberyard we are causing a bit of forest to be lost somewhere. But what we are really doing is sending a signal into the marketplace to plant more trees to produce more wood to supply the demand in the lumberyard. It is no different from any other renewable crop; it's just that trees take longer to mature than annual farm crops. As long as the demand for wood is steady and strong, landowners, both private and public, will plant trees to supply that demand.

There is the same area of forest in both the U.S. and Canada today as there was 100 years ago; in fact, the area of forest has been growing in recent years. This is despite a tripling of population and an even larger increase in the consumption of food and wood products. About 85% of timber production in the U.S. is from private lands. Those millions of individual landowners could easily remove the forest from the land and grow crops like corn or cotton or raise cows for beef. But they choose to grow trees because they know they will get a good price for them to pay their taxes, send their children to college and live a good life. Because landowners choose to grow trees, the land remains forested, providing habitat for other plants and wildlife, pulling carbon from the air, protecting soil from erosion and making the landscape beautiful. Rather than illustrating the common belief that forestry destroys the forest, it is truly a win-win solution for the environment and the economy, maintaining the land in a forested state while providing an income for the owners.

Of course it is important to maintain large areas of land as parks and wilderness, and make them off-limits to industrial development for factories, managed forests or farms. The World Wildlife Fund, one of the largest nature protection groups, states that 10% of the world's forests should be protected from development. I would have no problem with 15% or even more in some cases. In California, about 25% of the natural range of the coastal redwood forest is completely protected. The redwood is a unique tree, the tallest in the world, and creates such a beautiful ecosystem, that it is reasonable to protect a significant percentage as natural forest. But some anti-forestry activists are never satisfied.

They would fight until every tree was protected as if using trees for wood products was unnecessary. Redwoods produce a unique wood that is both durable for outdoor use as well as beautiful in color and texture. Therefore it is also reasonable that large areas of the redwood forest be sustainably managed for timber. The most important thing is to make sure that as much of the forest as possible is retained either for protection or forest management, and as little as possible is deforested and converted to non-forest uses.

In recent years, anti-forestry activists have claimed forest harvesting and forestry in general has a negative impact on climate change. The group ForestEthics (an offshoot of Greenpeace) claims forestry amounts to a "carbon bomb," referring to the release of CO₂ from decomposing wood immediately after harvesting.

It is true that there is a net release of CO₂ as a result of harvesting, but the activists fail to take into account that new trees are soon established and that they absorb all that CO₂ back over time as they grow into a new forest. And they fail to take into account the reduction in wildfires in managed forests, which reduce the amount of carbon that goes into the atmosphere. A hot wildfire not only burns trees but it also burns

soil, causing a far greater release of carbon than just harvesting the trees. And, most important, the wood harvested is used to build homes where the carbon in them remains stored for many years. In addition, when we use wood we avoid the use of non-renewable materials such as steel and concrete, which require large amounts of energy to manufacture, putting more CO₂ into the atmosphere.

In the final analysis, the combination of harvesting trees and then reforesting the area, suppressing wildfire, storing carbon and using renewable wood instead of non-renewable materials has a large net positive impact in terms of greenhouse gas emissions. Yet in order to further their anti-environmental aim of curbing the use of wood, activists distort the truth and mislead the public. They make these claims despite the fact that both the Kyoto Protocol on climate and the Intergovernmental Panel on Climate Change (IPCC) have clearly recognized the benefits forest management bring to reducing greenhouse gas emissions.

When it comes right down to it, we must recognize that wood is the most abundant and most environmentally friendly renewable source of both materials and energy resources on earth. About 75% of all our renewable energy comes from wood, used mainly for cooking and heating but also for making charcoal, drying lumber and producing pulp and paper. Wood provides more than 90% of our renewable materials for buildings, furniture, packaging and sanitary products. One of the great ironies of the "environmental" movement today is that it claims to support all things renewable on the one hand while at the same time ignoring or rejecting the fact that wood is far and away the most important renewable resource. Environmental activists place huge importance on solar panels made from aluminum, silicon and gallium arsenide when in fact the most important solar collectors on earth are the leaves and needles of trees and other plants.

There is probably no better way to make trees the answer than to use more wood for our buildings and other infrastructure. All things considered it makes sense both environmentally and economically to use more wood in our buildings, especially where it is not exposed to the elements and kept dry. If wood is protected from water and sunlight, it will last for hundreds of years. The more wood we use, the more trees we must grow and therefore the more land will remain forested. That is the real win-win solution for the environment and the economy.

(Source: Excerpted from *Confessions of a Greenpeace Dropout: The Making of a Sensible Environmentalist*, courtesy of Beatty Street Publishing, www.beattystreetpublishing.com)

Solar-Heated Lumber Dryers: Design Basics

Solar Energy Basics

Solar energy is an abundant energy source throughout most of the world. However, the cost of collecting it and the fact that it is a low intensity form of energy means that solar energy may not be suitable for all energy-using applications. This article points out a few of the theoretical and practical aspects of collecting and using solar energy as they relate to applications in lumber drying.

Solar Intensity

Energy is measured in various sets of units including calories, BTUs, and kilowatts. This article will use BTUs. A BTU is the energy needed to raise the temperature of one pound of water (= one pint) by 1° F. To evaporate one pound of water requires about 1,000 BTUs.

A flat, horizontal surface will receive an average of 1,000 to 1,200 BTUs of solar energy per day in much of the United States. On sunny days the energy received will be higher than the average, and on cloudy days it will be less. Obviously, there are some locations that due to cloudy conditions receive less than this average; and, conversely, there are some exceptionally sunny locations that will receive more.

The bulk of the energy appears to come directly from the solar disc. But as the solar energy passes through the atmosphere, it is dispersed so that important amounts of energy come from the other areas of the sky in addition to the area around the solar disc. Nevertheless, a flat surface will receive the most energy if it points directly toward the sun (i.e., is perpendicular to the sun or solar disc), following the sun as it rises until it sets.

Because equipment to accurately (usually within 5 degrees) track the sun is expensive, a simpler arrangement is to adjust the flat collecting surface so that it faces due south and is slanted at an angle so that at solar noon the surface is pointed directly toward the sun. Such an arrangement would have several adjustments ranging from +23 to -23 degrees (winter to summer) around the base angle. The base angle is measured from the horizontal and is equal to the latitude of the collector's location. For example, a collector located at 43 degrees north would be tilted southward 66 degrees on December 21, 43 degrees southward on March 21 and September 21, and 20 degrees on June 21. Intermediate days would have corresponding intermediate angles. From a practical point of view, the angle would be adjusted once every three or four weeks.

With a solar-heated kiln, a fixed collector is used in most cases. In this case, for best year-round performance, the collector is set at an angle (from the horizontal) equal to the collector's latitude. An angle of (latitude + 10) degrees (that is, steeper) is suggested for better winter performance; an angle of (latitude - 10) degrees (that is, flatter) is suggested for better summer performance.

In all collectors of any shape or design, the area of the top of the collector which is perpendicular to the sun (that is, the area of the shadow made) is the critical area. It is NOT the area of the absorber underneath the top of the collector that is important.

Collector Design

It is easiest and most economical (by far) to make a solar-heated kiln collector a flat collector. The top of the collector will typically be covered with two layers of transparent, or nearly transparent, material. This covering material is called glazing. Although one layer of glazing is quite effective, a second layer can substantially decrease heat losses while decreasing the input of solar energy only slightly. Overall, the collector performance is improved by 35% or so, when a second layer is used. Incidentally, the benefit of a third layer of glazing is much less; when the cost is considered, the benefit is usually uneconomical for a third layer of glazing.

Typical glazing materials include glass, rigid sheets of fiberglass-reinforced polyester panels (corrugated or flat), and polymer plastic films such as Mylar®, Tedlar®, Kalwall® that have been treated so as to avoid rapid deterioration due to ultraviolet light. My favorite is the corrugated fiberglass panels, as they allow most of the solar energy into the dryer, provide good heat barriers for heat loss, are extremely durable, and are not too expensive.

Under the glazing will be an absorber whose purpose is to absorb nearly all of the incident solar energy (that is, minimal reflection and transmittance). Typically, the absorber is a wood surface painted flat black. The color is the primary factor in ab-

sorbency. The absorber does not need to be right under the collector cover; but there is a slight benefit if the absorber is away from the collector cover. In fact, in most solar-heated kilns, the interior walls will be part of the absorber.

Once the energy is absorbed, it must be transferred as heat to the surrounding air. In most solar-heated kiln designs, the space between the glazing and the absorber provides a chamber to circulate the air past the absorber and transfer this heat.

Special note: Because the absorber surface is hot, the surface will be emitting long-wave (infrared) radiation. Glazing materials are chosen so as to be opaque to this radiation, thereby minimizing infrared energy losses through the glazing.

The surface of an absorber can easily exceed 200°F on a sunny summer day. Designs for collectors should include the possibility of thermal expansion of collector materials and should include possible thermal degradation effects (such as glue failure in plywood).

Solar Design Concepts

Hot Air Collectors

There are three basic hot air dryer designs:

- greenhouse
- semi-greenhouse
- opaque walls with a separate collector
(Note: Hot water solar systems would function inside the dryer just like any hot water kiln; that is, solar-heated water is the same as water heated by other means. Water solar systems are quite expensive and so are not discussed here.)

Energy is lost from a dryer in three ways:

- energy lost by conduction through the walls, roof (including the glazing surfaces) and floor,
- energy lost by ventilation (exhausting warm, moist air from the dryer and bringing in the cooler, drier outside air),
- energy lost (or used) to supply the heat of evaporation.

In almost any climate, the dryer design should develop temperatures as high as possible. Higher temperatures result in faster drying due to faster water movement and lower relative humidities and also lower final MCs.

- **Greenhouse designs.** A greenhouse dryer typically is a frame structure with transparent or translucent glazing on the roof and three walls—east, west, and south. The collector is an integral part of the dryer. Because the thermal insulation properties of most glazing materials are poor, the heat losses by conduction through the walls are quite high. Likewise, there is typically loss of solar energy passing through the dryer without being incident on an absorber, unless special care is taken. A solid north wall with a door is used for loading and unloading. Drying may be slower than other designs and final moisture contents may be higher because of the generally lower average temperatures in the dryer.
- **Semi-Greenhouse Designs.** The semi-greenhouse design usually has only the roof or the roof and south wall glazed; the other surfaces are opaque and insulated. This design substantially reduces the conduction heat losses, thereby resulting in higher dryer temperatures and faster drying (that is, there is more energy available for evaporation). The semi-greenhouse dryer design is typically a wood frame structure with plywood or lumber sheathing. The collector is an integral part of the dryer's roof. These designs will generally achieve lower final moisture contents than the greenhouse designs.
- **Opaque Wall Designs.** In this design, the lumber is placed in a solid, opaque walled and roofed chamber that is usually insulated, much like a standard lumber dry kiln. The solar collector is separate from the dryer, with hot air or hot water being

(continued on page 6)

Nebraska Forestry Industry Spotlight



O'Neill Wood Resources



O'Neill Wood Resources, owned and operated by Patrick O'Neill, began operation in 2005. The facility, located five miles west of Grand Island on Old Potash Highway, primarily produces wood chips. For its first five years of operation about 95 percent of O'Neill Wood Resources' production was used as fuel by Consolidated Blenders of Hastings in their alfalfa dehydration process to produce alfalfa pellets for livestock feed. By switching from natural gas to wood chips as fuel for the dehydration process, Consolidated Blenders was able to recover their investment costs within three years. This alliance worked well until 2010 when Consolidated Blenders decided to liquidate their holding and dissolve the alfalfa pellet franchise.

Since 2010, O'Neill Wood Resources has been focusing on wood chip production for the landscape mulch and animal bedding market. Wood material used for chips come from various sources including local tree services cleaning projects along the Platte River, but mostly from grinding pallets from the Case IH plant in Grand Island and other production plants in the area (T & L Irrigation in Hastings, Overhead Door, Grand Island, etc.). O'Neill points out, "from the Case IH plant alone, we will chip a pile of pallets 30 feet high, 50-60 feet wide, and 400 feet long every three to four months." Besides pallets, O'Neill says that his operation has helped out in chipping tree debris from past storm events such as the Kearney tornado.



Rotochopper 256 being fed

O'Neill Wood Resources, which has six full-time employees, operates two wood chipping machines. The 2007 "Roto Chopper" Model EC 256 horizontal grinder produces two-inch chips for landscape mulch. By sending the chips through the grinder a second time and using a smaller screen, one-inch chips for livestock bedding can be produced. Powered by a 400 horsepower, three-phase electric motor, 10 to 15 tons per hour of two-inch chips can be produced by the Roto Chopper. On-site chipping is accomplished by a Morbark Model 4600 trailer-mounted chipper. Powered by an 850 horsepower Caterpillar engine, a 36-inch diameter tree can be processed by the 4600. An 85,000 pound excavator with a thumb is used to load the Morbark chipper.

When used pallets are chipped, magnets located on the conveyor discharge removes metal. For livestock bedding, chips are triple screened over three magnets and landscape chips twice. Landscape chips are also colored red or brown for the residential market.

O'Neill Wood Resources is always looking for new customers. They currently have an inventory of 10,000 tons of chips available. Contact information: O'Neill Wood Resources, c/o Patrick O'Neill, PO Box 2202, Grand Island, NE, 68802. Phone: 308-384-1690; Fax: 308-381-1697; E-Mail: pat@oneillwr.com.

Solar-Heated Lumber Dryers *(continued from page 5)*

ducted or piped into the kiln from the collector. The dryer can be well insulated, minimizing heat losses. This design lends itself to using supplemental heat, as collector losses at night or during cloudy weather have no effect if the connection between the dryer and collector is closed off. Final moisture contents can be extremely low with these designs. Cost is very high. In lower solar input months, this can be used as a dehumidification-powered dryer.

Other Design Considerations

- **Storage.** Over a 24-hour time period, a solar-heated dryer will have the same energy input with or without storage. So why spend extra money for energy storage if there is little or no benefit? Of course, one could build a separate solar system to collect and store energy and then use the stored energy on a cloudy day. However, is the cost of such a storage system worth the benefit? Probably not.
- **Circulation.** Air is circulated in the dryers to facilitate heat transfer from the absorber and to assure uniform drying. A typical air velocity through the lumber pile is 150 feet per minute. When this value is multiplied by the total sticker space openings, the result is the average cubic volume of air required. For example, with 16-foot-long lumber stacked in 20 layers with 3/4-inch (3/48-foot-) high stickers, the air flow is (16 x 20 x 3/48 x 150 =) 3,000 cfm (cubic feet per minute). Because of air leaks, this value is increased by 50% when purchasing fans.

The fans are usually located in the hottest part of the collector to provide the best heat transfer. The risk of such a location is, however, that if the fans are shut off on a sunny day, the excessive temperatures in the collector could cause damage to the fans.

Due to the poor drying rates at higher humidities (and therefore potential inefficient use of electricity), fans would be run only when humidities are low. In other words, fans might be turned on an hour or two after sunrise as the kiln begins to heat up and then turned off an hour or two after sunset as the dryer cools and humidity increases.

- **Ventilation.** The drying rate in the dryer can be controlled directly by varying the relative humidity in the dryer. Low humidities result in faster drying and lower final moisture contents than do high humidities. Humidity is controlled by venting—that is, controlled by exhausting some of the heated, moist air from inside the solar dryer and simultaneously bringing in cooler air from outside. When this cooler outside air is subsequently heated, its relative humidity is lowered, thereby assisting drying.

At the same time that the moist air is exhausted, there is also a loss of energy (that is, the exhaust air is hotter than the incoming air). This loss of energy and the benefit of venting must be considered together. Excessive venting will be wasteful and will result in cool temperatures inside the dryer and therefore slow drying. On the other hand, inadequate venting may result

in very high humidities, which also will result in slow drying. In general then, venting should be sufficient to lower inside humidities, but not to substantially reduce inside temperatures. For many dryer designs, the vents are several times larger than needed and so would never be fully opened.

In practice, with wet lumber that is prone to checking and cracking, the vents are kept nearly fully closed for the first several days in order to keep humidities high and to keep drying from proceeding too rapidly. As the wood dries or for non-check-prone species, the vents are opened slightly to achieve moderate drying rates. For nearly dry wood, the vents are again closed most of the way in order to maximize heating and to develop low relative humidities needed to achieve low final moisture contents.

- **Insulated Walls.** Heat is lost from the dryer by conduction through the walls and floor. Limiting these heat losses, even in warm climates, will result in better performance of a solar dryer, with more energy available for the main task of evaporation. In general, the solar gain achieved from transparent walls is not large enough off offset the heat losses through these walls. Therefore, in most cases the walls should be insulated to reduce heat losses.

The dryer construction should be tight enough on the inside so as to prevent the insulation from getting wet. A plastic sheet on the inside of the walls or coating the inside of the dryer with a vapor-resistant coating such as aluminum paint is recommended. The use of preservative-treated wood for the walls and floor would be a good practice to

avoid insect and decay damage.

Collector Size

As discussed below, the amount of energy that is received by the dryer controls the amount of water that can be evaporated. Therefore, to control the drying rates and to avoid any drying defects, the collector size can be specified.

Consider the following examples: For woods that are prone to cracking and splitting, a typical safe drying rate might be 3.5% moisture content (MC) loss per day. This is equivalent to a collector size of 100 square feet per 1,000 board feet of lumber. For species that can be dried faster, the collector-to-board-foot ration can be increased safely, while for more degrade-prone species (or thicker pieces of moderate degrade-prone species) the ration can be smaller (cover up part of the collector).

Supplemental Heat

If supplemental heat is to be used, such as a dehumidifier or a wood-stove, careful consideration should be given to the benefit of including solar energy at all, due to the high heat losses likely to exist in the collector. Further supplemental heat will likely create drying stresses (casehardening) that will be sufficiently large at the end of drying so as to require stress-relief steaming or water spray treatment.

(Source: *Independent Sawmill & Woodlot Management* magazine, Feb. 2008. Article written by Gene Wengert, Professor Emeritus, University of Wisconsin-Madison and President of the Wood Doctor's RX, LLC, in Madison, WI. For more information or to subscribe to IS&WM, phone 1-888-762-8473 or website: www.sawmillmag.com)

Study Reveals Component Market Trends

The cabinet industry continues to be the largest end-use market for wood component products, primarily due to the steady strength of the remodeling market for kitchen, bath, closet and storage-related cabinetry. This information, along with other trends, is included in the "2011 Dimension & Components Market Study" by the Wood Component Manufacturers Association (WCMA).

According to the study, the cabinet industry currently accounts for 33.1% of WCMA members' total business, compared to 31.2% last year. Although the kitchen and bath cabinet industry retained a high percentage of WCMA members' products, the overall sales volumes in this industry decreased by 4.1% in 2010, according to the Kitchen Cabinet Manufacturers Association's Trend of Business Survey.

The building products industry — trim, mouldings, millwork, staircase parts, etc. — remained the second largest end-use market for WCMA members' products and represented 32.2% of WCMA participating members' shipments compared to 28% last year. This industry is expected to rebound as a major market for dimension and component manufacturers if the housing and remodeling markets show stronger recovery this year and into 2012.

The furniture industry stayed in third place, remaining fairly flat and accounting for 20.9% of dimension and component sales, compared to the 21.1% reported last year. This stability is generally attributed to more customization available from domestic manufacturers and to the fact that some furniture manufacturers have started outsourcing production back to the United States and Canada.

Decorative and specialty products remained in fourth place, with 8.1% of sales compared to 10.2% the previous year. This category includes musical instruments, caskets, toys, sporting goods, wall plaques, picture frames, cutting boards, novelty items, etc. Industrial wood products represented 4.5% of the total market for component products, down from 6.4% last year.

In looking at the type of components, cut-to-size blanks remained the number one category this year, accounting for 15.0% of all shipments, compared to 11.5% the previous year. Mouldings moved into second position, accounting for 13.9% of products shipped in 2010, compared to 8.2% in 2009. Stair parts moved up to third at 9.9%, up from 8.5%; followed by edge-glued panels at 9.4%; cabinet doors (5.2%); drawer boxes (3.5%); tool handles (4%); board programs (3.9%) cabinet parts (3.5%); and turnings (3.5%).

In looking at species preference, red oak remains popular, accounting for 20.5% of all wood used by participating WCMA companies. Hard maple dropped to 16.6%, followed by cherry at 11%, soft maple (9.7%), poplar (8.1%), beech (4.8%), white oak (4.8%), ash (4.1%), birch (3.6%) and composite panel (2.8%).

On the business side, 63% of participating WMCA companies indicated they are exporting dimension and component products to overseas markets, compared to 47% in the 2010 survey. Edge-glued panels was the largest dimension export product category, followed by cut-to-size blanks, furniture parts, stair parts, flooring, turnings, cabinet doors, mouldings and dowels. Canada was the number one export market among U.S. WMCA exporting members in 2010, with 26.8% of sales. The United Kingdom was second with 18.4% of export sales, followed by the United States (from Canada), Germany, China, Ireland, Japan and Mexico.

Overall, the study found that general outlook for the dimension and component manufacturing industry is for more of a recovery later this year, going forward to 2012. WCMA members project their dimension and component sales to increase by an average of 10% in 2011 and estimate their net income to be 9% higher. Total employment is expected to rise by 5%, material costs by 5%, plant and equipment expenditures by 6%, and labor costs are expected to rise 5% in 2011.

(Source: *Wood and Wood Products*, July 2011).

The Trading Post

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For Sale

Sawmill. Mighty Mite band sawmill. 20 horse electric motor, tandem axles with brakes on one axle, 36" x 24' log capacity, (I have cut 46" beams) hydraulic operation includes winch, knees, taper, near arm, dogging arms, far arm, dogging spike, log loading arms, and electric clutch and blade lift. Also includes automatic blade sharpener, setting machine, 12 used blades and 4 new blades. Excellent condition. Never been used commercially. \$17,500. Contact: Gary Fisher, Crawford, NE. Phone: (308) 665-1580; email: fisher@bbcwb.net.

Tree Shear. 14" Dymax Model 2135D1, Double grapple. Used very little. Excellent condition. Fits universal skid loader mounts. \$4,000. Contact: Gary Fisher, Crawford, NE. Phone: (308) 665-1580; email: fisher@bbcwb.net.

Sawmill. Circular sawmill. Includes power unit and two 48-inch insert tooth blades. Contact: Monte Reynolds, R&R Sawmill, 75455 Rd 409, Farnam, NE 69029. Phone: (308) 569-2345.

Lumber. Rough cut. Air dry. Approximately 500 bf – Black Walnut, 290 bf – Pecan, 100 bf – Poplar, 500 bf – Cherry, 500 bf – Soft Maple, 100 bf – Hickory, 300 bf – Ash. Contact: R&R Sawmill, 75455 Rd 409, Farnam, NE 69029. Phone: (308) 569-2345.

Walnut Logs and Walnut Boards. Shedded for 20 years. Boards up to 3 inches thick. Near Pleasant Dale, NE. Contact: Ernie Rousek at 402-488-9032 or email: erousek@neb.rr.com.

Walnut Lumber. All dimensions. \$3.00 per board foot. Falls City, NE. Contact: Bruce Walker at (402) 245-2031.

Wanted

Logs and Slabwood. Cottonwood, cedar and pine. 4" to 26" diameter and 90"-100" lengths. Below saw grade logs acceptable. Contact: American Wood Fibers, Clarks, NE at (800) 662-5459; or email: Pat Krish at pkrish@AWF.com

Cottonwood Logs. Veneer-quality cottonwood logs, 16" to 36" diameter, 7' and longer. Pick up service available. Contact: Barcel Mill & Lumber, Bellwood, NE 68624. Ask for Barton or Megan. Phone: (800) 201-4780; email: bj@barcelmill.com.

Horse-drawn or Tractor-drawn grader. With front wheel dolly. Contact: Carl Hinds, S. Sioux City, NE. Phone: (402) 494-2127 or cell (712) 281-1472.

Services and Miscellaneous

Woodshop Services. Millwork made from your lumber on my planer/molder. Chris Marlowe, Butte, NE (402) 775-5000. Marlowepasture@nntc.net.

Sawmill Service and Supplies. Saw hammering and welding. Precision knife and saw grinding. Certified Stihl chainsaw sales and service. Contact: Tim Schram, Schram Saw and Machine, PO Box 718, 204 E. 3rd St., Ponca, NE 68770, (402) 755-4294.

Used Portable Sawmills. North America's largest source of used portable sawmills and equipment. Contact: Sawmill Exchange (800) 459-2148, website: www.sawmillexchange.com.

Food for Thought

For those who refer to Aldo Leopold's "land ethic" as the guiding philosophy for management of forest land, this quote from "A Sand County Almanac" indicates his opinion of the role of timber harvesting in land stewardship.

"I have read many definitions of what is a conservationist, and written not a few myself, but I suspect the best one is written not with a pen, but with an ax."

**You know you're
from Nebraska if...**

You drink "pop".