Energy expenditures for U.S. wood products manufacturers have been continuously rising over the last decade, for example, electricity prices have risen at an average annual rate of 1.6%, diesel prices have climbed 11.5%, and the price for industrial use natural gas has more than doubled. Figure 1 shows these impacts for a ten-year period ending in 2008 along with hardwood stumpage and lumber prices, which decreased during this time period. The American Forest and Paper Association has determined that energy expenses are the third largest cost for the US forest products industries, after raw materials and labor. Natural gas and electricity account for about two fifths of total energy consumption of the wood products industry. Increases in energy prices impact the hardwood industry to a greater degree than the overall lumber industry, since their production requires higher energy input than softwoods due to longer drying times, drying to a lower moisture content and having a material more prone to drying defects.

Figure 1. Increase cost of energy and the reduced price of hardwood stumpage and lumber for 1997 through 2008.
IMPACT OF ENERGY RISING PRICES
A study recently completed at Virginia Tech provides some insight as to what the impact of higher energy prices has been on the hardwood industry. For example, survey respondents from both the primary and secondary hardwood industry were asked to report the percentage of their costs going to energy expenses. Answers varied widely, from 1% to 39%, with an average of 7.9%. The majority (61.8%) of companies answered that energy expenditures as a percentage of the total cost have increased during the last five years.

To assess the impact of rising energy prices on the companies’ profits, they were asked to estimate this as a percent of profits over the last five years. Close to 43% reported an impact smaller than 5%, while 50% of companies reported impacts of 5% or greater. Only 6% of companies indicated no impact on profits from higher energy prices.

RESPONSES TO HIGHER ENERGY PRICES
There are several ways a company can respond to increased energy prices, like negotiating with their utility to find a better rate schedule, installing energy-saving equipment, or training personnel to save energy. In the survey mentioned, companies were asked what they were doing to ameliorate the effect of higher energy expenditures. Surprisingly, 22.1% of respondents indicated that they were not taking any action and were accepting a lower profitability as a result of higher energy costs. Sixteen percent of companies were reviewing energy suppliers’ agreements, negotiating a different rate schedule or switching suppliers. About a fourth (25.6%) increased prices to customers to offset higher energy prices. The adoption of energy-saving technologies was selected by 26.7% of companies. Lastly, a similar number of companies (41.3 and 41.9%) were improving the energy efficiency of their operations and improving productivity.

When asked to select from a list of actions implemented to reduce energy consumption, the majority (67%) indicated that they were training personnel on energy saving practices (e.g., turning off lights in areas with no traffic, lowering thermostat in winter, reporting leaks). Forty-four percent indicated that they started documenting energy consumption and savings. Only 9% reported having established a usage baseline, not surprising considering that only 20% of respondents reported practicing energy audits. A small number of companies reported establishing performance indicators (11%), using external standards (6%), and establishing a cross-divisional plan (5%). These low percentages reflect a lack of systematic and strategic approach to energy efficiency among survey respondents, since these are all necessary to achieve sustained and significant improvements in this area.

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ENERGY AUDITS AND ENERGY MANAGEMENT PRACTICES
Energy management is any activity performed systematically with the purpose of reducing energy consumption. A critical input for any energy management endeavor is conducting an energy audit. An energy audit is a comprehensive assessment of the energy usage at a facility. Results from energy audits are useful for learning about current consumption, assessing the potential for improvement (by comparing results with industry benchmarks or designed value), and measuring progress towards the established goals. The energy conservation potential as a result of energy audits can be significant, for example, for a group of 58 hardwood sawmills in West Virginia, the average energy saving achieved in one year after an energy audit and corrective action was 13.2 percent of the annual energy used, ranging from 8.1 to 25.4 percent. The top six recommendations given to the hardwood lumber industry from energy audits conducted by the U.S. Department of Energy and the payback period are: 1. reduce the pressure of compressed air to the minimum required (0 years), 2. Eliminate leaks in compressed air lines/values (0.17 years), 3. Recover heat from air compressors (4.58 years), 4. Use waste heat to produce steam to drive a steam turbine-generator (4.27 years), 5. Utilize higher efficiency lamps and/or ballasts (0.38 years), and 6) Use a more efficient light source (4.65 years).

There are other energy management strategies that can be used to reduce electric bills, including internal metering, special rate schedules, power factor correction, electric load control, standby generation, and federal and state programs. These are discussed in more detail below. Figure 2 shows the percentage of the hardwood industry that have adopted these strategies according the Virginia Tech survey in 2010.

- Interval metering is the recording of energy usage at very short intervals (e.g., every 15 minutes). This usually involves the installation of specialized equipment and software that allows tracking with great detail energy consumption at individual processes and on a continuous basis. This can be a great tool when trying to find energy-saving opportunities.
- Special rate schedules are sometimes offered by utilities to facilitate companies to manage their electric bills. Examples are flat rate schedules or time-of-the-day schedules. In the latter, different rates are charged depending on whether consumption happens during peak or off-peak hours.
- Power factor correction consists in the installation of banks of inductors or capacitors, sometimes in individual equipment, to reduce the reactive load. Companies have a financial incentive to do this when utilities have a reactive demand charge.
- Electric load control is any initiative by the electric utility to control the load from the demand side. This can be accomplished by offering a different rate for peak or off-peak hours, or by agreements by which the facility reduce its load at short notice from the utility in exchange for, for example, credits in its electric bill.
- In standby generation programs, facilities agree to transfer load to the network from its standby generator at a signal from the utility.
- State and federal government and utilities provide financial incentives, usually in the form of rebates, to companies willing to install high energy-efficient equipment, such as adjustable speed drives.

Continued on page 21
stronger than ever, getting enough Vitamin C, eating plenty of yogurt and flavanoids, maintaining your social network to avoid depression, and learning how to better manage stress.

As for preventing and reducing aging caused by environmental or social issues, the authors explain the importance of maintaining your bones, joints and muscles in order to prevent accidents and heal faster from injuries. You can do this by getting the right amount of physical activity – including some weight-bearing and non-weight-bearing resistance exercises to strengthen muscles, maintain and build bone density, and prevent osteoporosis, and some cardiovascular training to strengthen your heart and keep your arteries young.

The authors also recommend eating certain foods and nutrients that do great things for structure of movement, including getting enough of the following from your diet and/or from supplements: (1) Calcium for bone strength, (2) Vitamin D and Magnesium for absorption of Calcium and joint health, (3) Omega-3 Fatty Acids for joint health and to decrease inflammation, and (4) Vitamin C to prevent bone loss associated with Osteoporosis, and cartilage inadequacies associated with aging.

I highly recommend the “You” series of books for both you and your employees. And by now you can purchase most of them used at Amazon.com for little more than the cost of shipping. So why not buy a copy for everyone?

IMPACTS AND RESPONSE TO RISING ENERGY COSTS – Continued from page 11

No article concerning energy in the hardwood industry would be complete without discussing drying operations. Approximately ninety percent of the total energy input for a typical hardwood sawmill operation is used in lumber drying. One rewarding statistic for our industry is that close to half of lumber drying energy inputs are generated from biomass, mostly wood residues, whereas the percentage for the entire US manufacturing sector is only 12.3%. This statistic is good news for the industry – considering that mandatory targets for energy from renewable sources for the US Federal Government is 7.5% for 2013, and the European Union aims at 20% for 2020. One issue related to providing heat energy needs for lumber drying with wood waste is that many overlook energy losses since they don’t have to pay for the fuel. However, energy losses also increase drying times, which also increases electricity use. Also, as local biomass use increased there may be a lost opportunity cost. Energy reductions in drying can be gained through more air/fan drying of the lumber, boiler maintenance/tuning, and good kiln maintenance. Another way to reduce electricity consumption during drying is the use of adjustable speed fans and reduce the air velocity after the lumber drops below 30% moisture content, which can save 40 to 70% in electricity cost.

IN CONCLUSION

Increased energy costs have added to the constant squeeze on the hardwood lumber industries profit margins; however, surprisingly few have taken serious steps to reduce their energy consumption or to increase their energy efficiency and thus reduce energy expenditures. We hope that this article has provided some insight not only on what the current energy use situation is but also some ideas on how to change it, ideas that some of the hardwood industry are actually currently implementing to help reduce the impact of this serious issue.