



Unseen Green: The Role of Wood in Environmentally Sustainable Home Construction

By Bob Mang

While many builders have only started implementing green building practices in the past several years, homes have incorporated elements of green construction for centuries – even if unintentionally. Much of the current focus on green building is on solutions driven by advanced technologies, including energy efficient appliances, recycled materials, water saving fixtures, and even emerging items such as rain collection and reuse systems and ground source heat pumps. Cutting edge materials and practices are radically changing the way homes are built and lived in, yet some green products are so common that they can sometimes be overlooked. This is especially true for wood given that it has been a fundamental part of home construction throughout history.

By some estimates, 90 percent or more of the homes in the United States are built using wood structural framing. Builders choose wood because it is readily available, easy to work with and durable. At the same time, lumber and engineered wood products can be an important part of an environmentally sustainable home since they come from a renewable resource, help sequester carbon dioxide (CO₂), make efficient use of raw materials, and are energy efficient.

Renewable resource and reduction of greenhouse gases

More and more homebuilders and homeowners understand that wood comes from a renewable natural resource and they are learning how it helps mitigate the impact of other human activities on the environment. As trees grow, they pull large amounts of CO₂ out of the air as part of photosynthesis, helping reduce a principle greenhouse gas in the atmosphere. Once harvested, nearly one-third of the carbon stored in trees remains in the resulting wood products for the remainder of their useful life.

The amount of CO₂ sequestered in wood products is substantial. Products produced by iLevel by Weyerhaeuser alone in 2006 store a volume of CO₂ equivalent to eliminating emissions from more than 2.6 million passenger cars for one year. Putting it at a more personal level, the Canadian Wood Council reports that a typical 2,400 square foot wood-framed home holds an amount of CO₂ “equal to the emissions of a small car over seven years.”

While most people would readily recognize the carbon storage benefits of wood, there is also a general perception that harvesting trees is decreasing forested acreage. In fact, the opposite is true. A study by the American Forest and Paper Association and Clemson University in 2001 found that forest growth exceeds harvest by 47 percent and that the United States has nearly the same amount of forestland now as it did in 1920, despite a large increase in population. Aggressive tree planting programs by private industry and governments, combined with sustainable forestry practices, help ensure the availability of forest products for generations to come.

Efficient use of raw materials

The second way in which wood is an important part of green homebuilding is the efficient use of raw material in the manufacturing processes. This is especially true for engineered wood products, including laminated veneer lumber (LVL), laminated strand lumber (LSL), parallel strand lumber (PSL) and oriented strand board (OSB). Such products can be made from logs that are too small for conventional solid-sawn lumber and the manufacturing processes use virtually every portion of every log to produce strong, straight and consistent framing members. For example, TimberStrand® LSL and Structurwood® OSB use up to 80% of the available fiber in the final structural product. In many mills, bark, sawdust and other wood bi-products are used as fuel, which means that virtually no part of the original log goes to waste and saves on other fuels.

Engineered wood products also help optimize the use of wood through improved product design. For example, wood I-joists are engineered into a structurally efficient shape that can do more work while using less material than would otherwise be possible with a typical rectangular joist.

Energy Efficiency

A key concern for both builders and homeowners when building green is energy efficiency. From a broad environmental perspective, the Consortium for Research on Renewable Industrial Materials (CORRIM) found that a typical home framed with wood requires about 17 percent less energy than steel framing and about 16 percent less energy than concrete framing (based on a life cycle analysis from extraction through maintenance).

In terms of energy used to heat and cool the home, wood is also an excellent choice given its low thermal conductivity and good insulating properties. The cellular structure of wood helps trap air, serving as a natural insulator. Steel and concrete, on the other hand, have high heat conductivity and require additional insulation compared to the needs of wood framing.

Enhanced Frame Building Practices

Beyond the inherent green attributes of wood itself, an equally important trend underway is the development of design and construction practices that reduce wood waste. Structural frame design software, in particular, has improved dramatically in recent years. While previous programs did a good job of analyzing floors, walls and

roofs individually, software is now available that can specify optimized combinations of wood products for all parts of the frame. For example, Javelin® design software from iLevel allows for analysis of vertical loads from the ridge to the sill plate, enabling designers to effectively specify structural support members only in the places they are necessary, thereby reducing the total number (or reducing material).

Design software packages can now integrate with fabrication software to help support ready-to-install framing, from pre-cut and labeled kits of materials up to panelized framing components and systems. Using these tools, all of the individual members of the frame can be planned, specified and pre-cut to ensure the maximum use of each board, eliminating the need to trim two or three feet from boards on the job site. The result is a large reduction in the amount of wood waste going to landfills.

Newly developed products and practices are making it easier than ever for builders to construct homes that reduce humanity's impact on the environment. While continually looking for new approaches makes sense and will drive further improvements in home construction, builders should also evaluate how materials they are already using can be incorporated into an overall plan for a green home.

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About iLevel by Weyerhaeuser

iLevel is Weyerhaeuser's integrated residential framing business resulting in a seamless, unified solution for residential builders through dealers – offering a coordinated network of support for all structural framing materials. By combining Weyerhaeuser's high-quality products and services from well-known brands like Trus Joist and Structurwood, with its distribution and technology capabilities, iLevel efficiently supplies customers with all the necessary components for building the residential structural frame, and solving builder and customer needs around that frame.

About Weyerhaeuser

Weyerhaeuser Company, one of the world's largest forest products companies, was incorporated in 1900. In 2006, sales were \$21.9 billion. It has offices or operations in 18 countries, with customers worldwide. Weyerhaeuser is principally engaged in the growing and harvesting of timber; the manufacture, distribution and sale of forest products; and real estate construction, development and related activities. Additional information about Weyerhaeuser's businesses, products and practices is available at www.weyerhaeuser.com.