

# McGraw Hill CONSTRUCTION Continuing Education

## The Case for Certified Wood

Forest products deemed sustainable are a growing part of today's green buildings

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The demand in the United States for environmentally responsible building products continues to grow. Purchasing decisions are increasingly influenced by environmental platforms, and architects, builders, designers and consumers are looking to manufacturers for assistance. Soon, the sustainability and environmental responsibility of building products may be as important (or more so) to the building industry professional than colors, hardware or even price.

As a building material, wood has been used for centuries for its warmth, durability, longevity and natural beauty. Today, there is another reason for architects to specify wood: its contribution to a sustainable environment. This article will cover the environmental, energy and carbon-neutral attributes of wood, and explain the need for responsible forestry practices that keep wood building materials a truly green choice. Also discussed will be the various organizations that certify wood as sustainable and the ways in which points may be earned by specifying wood through the major green rating systems.

### Benefits of Wood as a Building Material

In addition to the fact that wood is one of a handful of major renewable structural materials in existence, wood has a number of other attributes that make it an intelligent environmental choice as a building material.

Wood stores carbon. In the carbon cycle, carbon is dispersed through the air, ground, oceans, plants and animals. Carbon dioxide is the basic raw material that plants use to convert solar energy into food, fiber, and other forms of biomass. Trees remove, or sequester, this carbon dioxide from the atmosphere during photosynthesis, using carbon molecules to make sugars and starches that feed the growth of cell walls. Trees then release the oxygen part of the carbon dioxide molecule back into the air, but the carbon remains in the tree, even when it is made into furniture or other wood products. The carbon in these wood products is basically inert and stable, and is kept out of the atmosphere for the service life of the product — or even longer if the wood product is recycled. After decades or even centuries of use, wood buildings can be easily adapted or deconstructed and reused, which means they can continue to store carbon indefinitely. The carbon is released only when the wood rots or is burned.



Continuing Education

Use the following learning objectives to focus your study while reading this month's Continuing Education article.

**Learning Objectives** - After reading this article, you will be able to:

1. Discuss the attributes of wood as an environmentally sound building material
2. Compare the major forest certification agencies
3. Specify certified wood for green credit



Products that incorporate certified wood add to a structure's sustainability.

Photo courtesy of JELD-WEN® Windows and Doors

Wood's ability to sequester carbon is an important attribute because carbon dioxide is a major contributor to global warming. Before the industrial revolution, the concentration of carbon dioxide was stable at some 280 parts per million — a figure that has risen to 380 parts per million, a 35 percent increase, in the last century. Today, close to eight billion tons of carbon dioxide are emitted every year, representing more than 75 per cent of total greenhouse gas emissions.

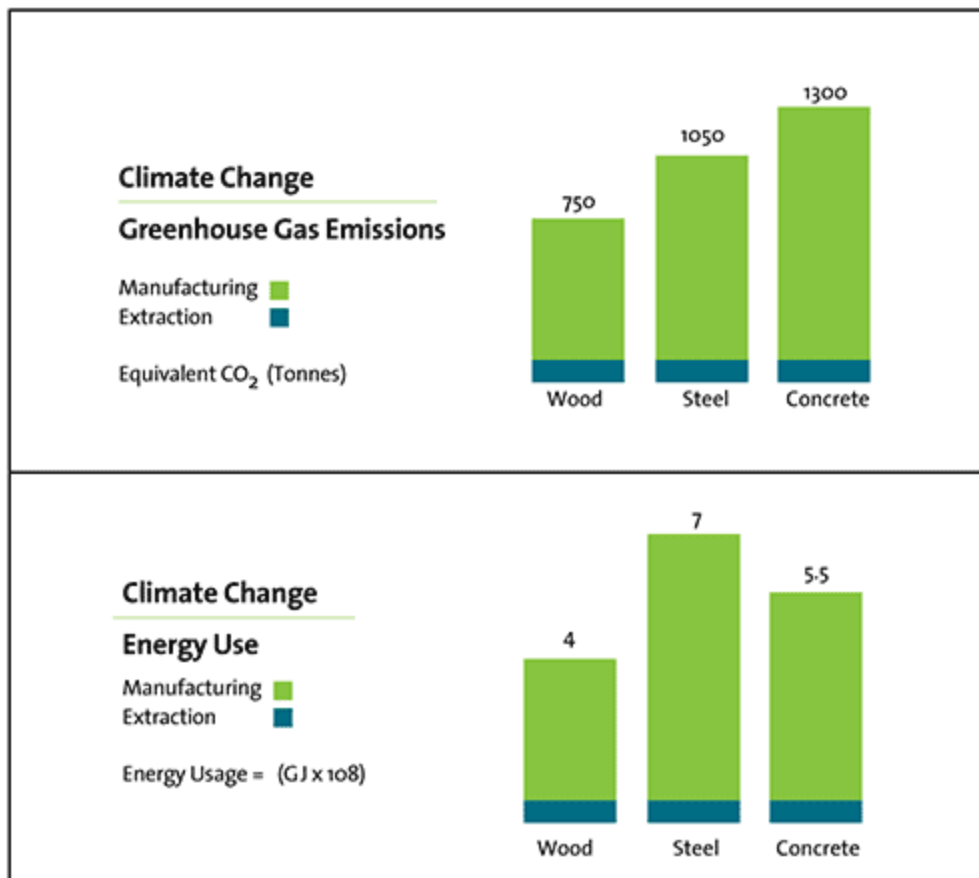
To recap, healthy forests absorb carbon dioxide and release pure oxygen, with the carbon incorporated into the trees, leaves and roots and soil, and then stored indefinitely in the wood products made from the trees. Not all trees store carbon at the same rate, however. Young, healthy trees have a higher rate of carbon dioxide conversion than older, more mature trees. In an unmanaged forest, old trees will stop capturing new carbon, though they will continue to store carbon until they start to decay.

Wood reduces fossil fuel consumption and embodied energy. Substituting wood for energy intensive building products like steel or concrete has a major impact both on energy usage and greenhouse gas emissions. Using low-impact wood products results in less carbon dioxide emitted and less total embodied energy used. The literature, notably by the Consortium for Research on Renewable Industrial Materials (CORRIM), is replete with life cycle assessment studies that demonstrate that wood requires substantially less energy to manufacture, transport, construct and maintain than other materials. When considering environmental impact using life cycle assessment, wood outperforms steel and concrete in the following areas:

- Embodied energy in production
- Emission of greenhouse gases
- Release of pollutants into the air
- Generation of water pollutants
- Production of solid wastes

Some consider life cycle assessment tools to provide a better picture of a material's environmental footprint than the point systems currently provided in certain popular green building rating programs. While life cycle assessment measures direct environmental impacts such as the amount of pollutants released, the rating systems gauge indirect product features such as the distance of the manufacturing plant from the site, that are to some extent related to sustainable objectives.

Wood is a renewable resource. With trees continually regenerating both naturally and through planting, there is more forest area in the United States today than there was 100 years ago. Forest growth in the United States exceeds harvest by over 35 percent annually.



Wood has superior insulation properties. Because its honeycomb cellular structure contains air pockets that limit its ability to conduct heat, wood is an efficient insulator. By comparison, steel and concrete facilitate heat transfer through a building's walls, which acts to actually increase a building's energy consumption.

Wood has a favorable strength to weight ratio. In comparing strength versus weight, wood is known to be stronger than steel, most fiberglass and aluminum. In addition, wood is stiffer pound-for-pound than fiberglass and steel, making it a highly efficient material for producing a given structure.

Wood can be engineered. Another increasingly popular green trend is the use of engineered wood. Engineered products are recycled or reconstituted wood materials using laminated wood chips or strands that are glued together. Not only can engineered wood products be a more efficient use of wood and rely less on large, older trees, they can drastically minimize the amount of waste created in processing raw materials. Waste wood, regardless of species, shape, and age, can be used in making these products. Because engineered wood is manmade, it can be designed to meet application-specific performance requirements. Large panels of engineered wood can be made from fibers of small-diameter trees, and small pieces of wood; even wood with defects can be used in many engineered wood products. In addition, engineered wood products often have greater tolerances in stability, consistency, straightness, and strength than dimensional lumber and consequently can be easier to work with. Some common engineered wood products include:

- Glulams, an engineered wood product comprised of wood laminations, or "lams," bonded together with waterproof adhesives. Components can be comprised of a variety of species. Generally, individual "lams" are up to two inches thick.
- Oriented Strand Board (OSB) is made from waterproof, heat-cured adhesives and rectangular wood strands arranged in crossed layers. Like plywood in structure, OSB has many of its strength and performance characteristics. Because it is manufactured in continuous mats, OSB is available as a solid panel of consistent quality.
- Joists are 'T'-shaped engineered wood structural members used in floor construction and flat roof applications. They are prefabricated using machine stress graded lumber or laminated veneer lumber flanges and wood structural panel webs bonded together.

## Demand for Wood and Wood Products

Building materials are not the only products made from wood. There are an estimated 5,000 different products made from trees ranging from the lumber and paper items to carpeting, clothing and even toothpaste. The average American uses about 749 pounds of paper every year. Approximately 95 percent of houses are built of wood — statistics that translate to the average person using the equivalent of a 100-foot high, 18-inch diameter tree every year for wood and paper needs. Economists predict that global gross domestic product (GDP) will double and per capita income in developing countries will triple over the next 20 years. As standards of living increase, so will the demand for natural resources, including wood.

However, the global production of wood and paper products will be hard pressed to meet the new requirements without succumbing to questionable forestry practices. The increasing demand for wood makes it more important than ever to adhere to sustainable forestry practices and avoid repeating the mistakes of the past.

## Need for Sustainable Forestry

At the beginning of European settlement in 1630, the land that would become the United States of America consisted of approximately 423 million hectares of forest, or about 46 percent of the total area. By 1907, forest land had declined to 34 percent of the total area, a number that has remained relatively stable, with today's forest land area amounting to about 70 percent of the area that was forested in 1630. Over the centuries, forest land has been converted to other uses, primarily agricultural, with the bulk of the conversion occurring in the 19th century.

During the late 19th century and early to mid 20th century there was intensive logging on the nation's timber land. While the early logging industry was largely romanticized, as westward migration progressed, laissez-faire logging policies and farmers clearing up to four acres of forestland for every additional settler, created a lumber front that moved constantly westward, depleting native forests. In many places, rapid harvesting and irresponsible logging methods altered native forests, creating simplified forests of same-aged trees with reduced immunity to fire and disease.

An environmental consciousness gradually took hold in the United States, spurring a movement toward forest management, reforestation, and erosion control that were seen as keys to limiting degradation from timber harvesting. An increasing interest in sustainability has thrown low-impact logging and other responsible policies into sharp focus, as the goal has become to balance current needs for lumber with the ability of future generations to meet their needs.

Unfortunately, many of the irresponsible logging practices that occurred in nineteenth century America have been repeated around the globe. More than half of Earth's original forest cover has been destroyed due to human activity such as agriculture, development and logging — much of the destruction occurring in the past 50 years. The situation is particularly dire in the rainforest, as the following statistics illustrate:

- Rainforests once covered 14 percent of the earth's surface; now they cover only 6 percent of the earth.
- Brazil's Atlantic rainforest is approximately 4 percent of its original size.
- Half of 10 million plants, animals and insects live in rainforest land. Over 100 species are lost every day due to deforestation.
- Over twenty percent of the planet's oxygen is produced in the Amazon Rainforest.

### Forest Certification History: A Response to Global Deforestation



Healthy Rainforest

So. America Slash & Burn

Photo courtesy of JELD-WEN® Windows and Doors

Protecting remaining forest cover is now an urgent task. Growing populations and burgeoning global economies are creating increased demands for forest products and services, thereby placing intense pressures on the world's forests. It is a considerable challenge to balance demand for products and services with maintenance of viable forests. In simple terms, sustainable forestry can be thought of as striking that balance between society's increasing demands for forest products and benefits, and the preservation of forest health and diversity. This balance is critical to the survival of forests, and to the prosperity of forest-dependent communities.

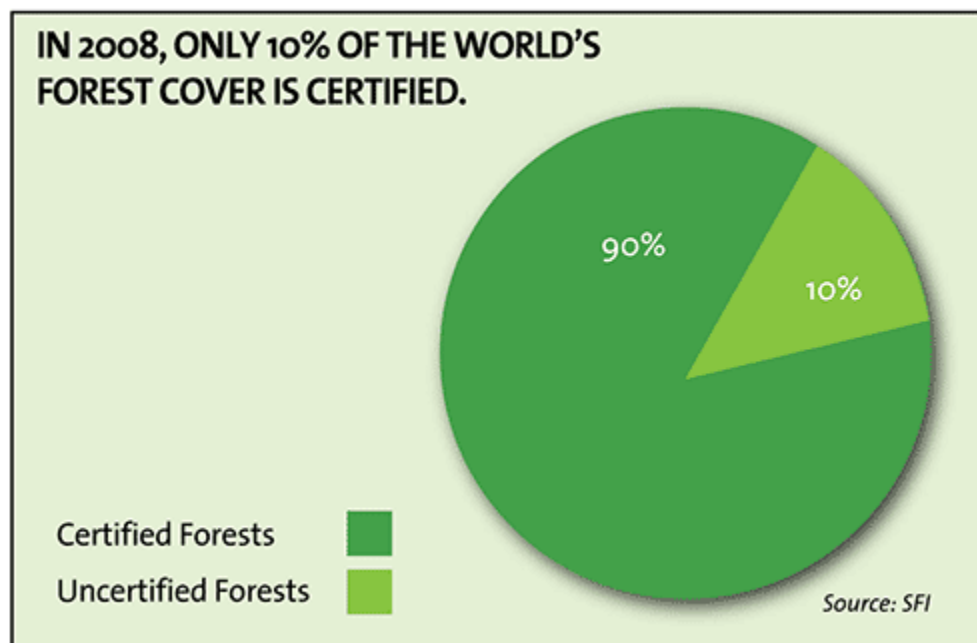
Some of the goals of sustainable forestry include:

- Ensure a sustainable supply of raw materials
- Maximize yields
- Control costs
- Protect against unauthorized wood in the supply chain

Much of the pressure will be on private forests. Nearly 60 percent of U.S. forest land is privately owned. An estimated 89 percent of timber harvested in the United States comes from private lands, an increase from 76 percent in the 1970s. These private lands provide the bulk of the country's forest products and environmental services.

#### Forest Certification

Forest certification helps protect forests from destructive logging practices. Designed to grant a seal of approval for wood or paper products that come from forests managed to strict environmental and social standards, forest certification programs provide consumers of windows and doors, for example, with third-party assurance that the wood in the product was sustainably harvested from a healthy forest, and not illegally sourced from a tropical rainforest or the homelands of indigenous people. By increasing consumer demand for certified products, retailers and manufacturers are more likely to use certified suppliers, which in turn prompts forest managers to adhere to ecologically sound management, avoiding such practices as largescale inappropriate clear cutting, logging in old-growth forests and cutting down natural forests in favor of tree plantations, especially in developing countries where the initial financial gains of rapid harvesting are enticing. Forestry certification not only provides consumers with assurance of conformance to a quality or performance standard, it increases the perceived value of the product in the marketplace. Forestry certification can also be a key differentiator among products and even among manufacturers.



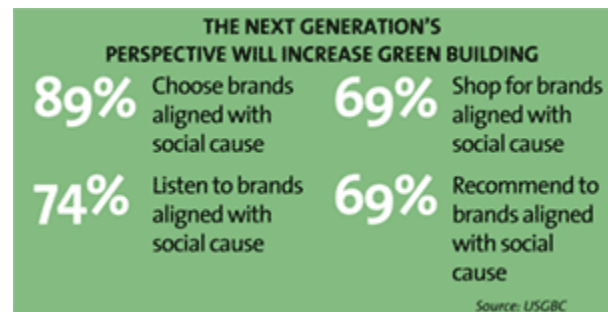
To carry a forest certification label, a product must have documentation proving it comes from a certified forest. This paper

trail is called the "chain-of-custody" and it provides a link between the certified forest and the certified forest product. In other words, chain of custody tracks and records the path logs take from the forest, through the different stages of production — primary manufacturing, secondary manufacturing, wholesaling, and retailing — all the way to the end user. Compliance with this standard means that customers can be assured that from harvesting to manufacturing to delivery to their door, the product has adhered to sustainable standards.

While the intentions are pure, a lot remains to be done in the area of forest certification. With approximately 35 organizations worldwide offering certification programs, as of 2008, a mere 10 percent of the world's forestland has been certified, according to the Sustainable Forestry Initiative.

### Benefits of Certified Wood

Using certified wood comes with a number of benefits, not the least of which is the intrinsic advantage of acting in an environmentally responsible manner. It provides assurance that the product has met rigorous environmental and social standards. The use of certified wood may contribute credits or points to a certified project under the various green rating systems. With the increasing consumer focus on sustainable lifestyles, homeowners may increasingly place a financial value on having a demonstrated component of their house identified as certified wood. Studies show the perspectives of the next generation of consumers will increase green building. According to the USGBC, the overwhelming majority of nextgeneration consumers already choose brands aligned with a social cause and a clear majority will recommend brands aligned with a social cause.



Further, purchasing certified wood ensures the long-term sustainability of the forests from which the wood was harvested. It ensures that forests are maintained, with support for continual wood supply and minimization of illegal logging. In short, purchasing certified wood drives the entire market toward sustainable practices. On the other hand, buying wood from forests that are not managed in a way that can be independently audited and scientifically evaluated to protect the entire ecosystem may be an environmentally risky choice and, at worst, counter productive to the sustainable forestry movement.

### North American Certification Schemes

Around the globe, there are many forestry certification organizations, most addressing the need to protect our diminishing tropical rainforests. In North America, the Sustainable Forestry Institute (SFI) and the Forestry Stewardship Council (FSC) are the two primary standards for larger landownership. Both are discussed below, along with other standards applicable to North American forests.

#### Sustainable Forestry Initiative (SFI)

In 1994, members of the American Forest and Paper Association formed the Sustainable Forestry Initiative (SFI) in order to visibly improve forestry practices. Since then, the SFI has gone from trade association to one of the largest internationally recognized independent certification programs in North America. In 2006, the group issued the requirements for fiber sourcing, chain of custody, and product labels. In 2007, the SFI became fully independent of the American Forest and Paper Association in response to concern that it was too heavily influenced and controlled by industry interests. The SFI is now governed by an independent board of directors combining environmental groups and forest product companies.

With over 152 million acres certified across North America, the SFI sustainable forestry certification program is one of the largest in the world, with standards based on principles and measures that promote responsible, science-based environmental behavior and sound forest management. Today, the SFI program has more than 220 program participants and chain of custody holders in the United States and Canada. Its program offer four different labels and allows participants to include statements regarding recycled content. The SFI operates on the premise that responsible environmental strategies and sound business practices benefit all stakeholders — foresters, landowners, loggers and wood and paper producers.

#### Forestry Stewardship Council (FSC)

The Forestry Stewardship Council (FSC) was established in 1993 as the first worldwide certification system for forests and forest products. While the organization does not directly certify forest products, it does accredit and oversee independent certifiers who evaluate forest practices in terms of environmental and social criteria. Forest operations conforming to those criteria are allowed to deem their products as originating from a well-managed source. The certifier also assesses the "chain of custody," or the path the wood and fiber take throughout production, from the manufacturer to wholesaler to retailer to ultimate user. Over the past 13 years, FSC has certified over 240 million acres globally and 80 million acres in the United States and Canada, with the amount of acres under FSC certification growing at an average rate of 25 percent over the past year. Products carrying the FSC label are independently certified to assure consumers that they come from forests that are

managed to meet the social, economic and ecological needs of present and future generations.

#### Programme for the Endorsement of Forestry Certification (PEFC)

The Programme for the Endorsement of Forest Certification schemes (PEFC) is an international, independent, non-profit, non-governmental organization founded in 1999, that promotes sustainably managed forests through independent third party certification. Since its launch, PEFC has become the largest forest certification umbrella organization; it covers national systems from all over the world, delivering hundreds of millions of tons of wood to the processing industry and then onto the marketplace. Currently, more than 494 million acres are certified forests — an area larger than the combined forest area of all European Union member states. At this size and growing rapidly, it is by far the largest global program for certifying sustainable forests. Canada, the United States, Norway, Finland, Spain, Brazil, the Malaysian Republic, and many other European countries are among those with PEFC-approved forest certification systems. PEFC has strong grass roots support from many stakeholders including the forestry sector, governments, trade associations, trade unions and nongovernmental organizations.

#### American Tree Farm System (ATFS)

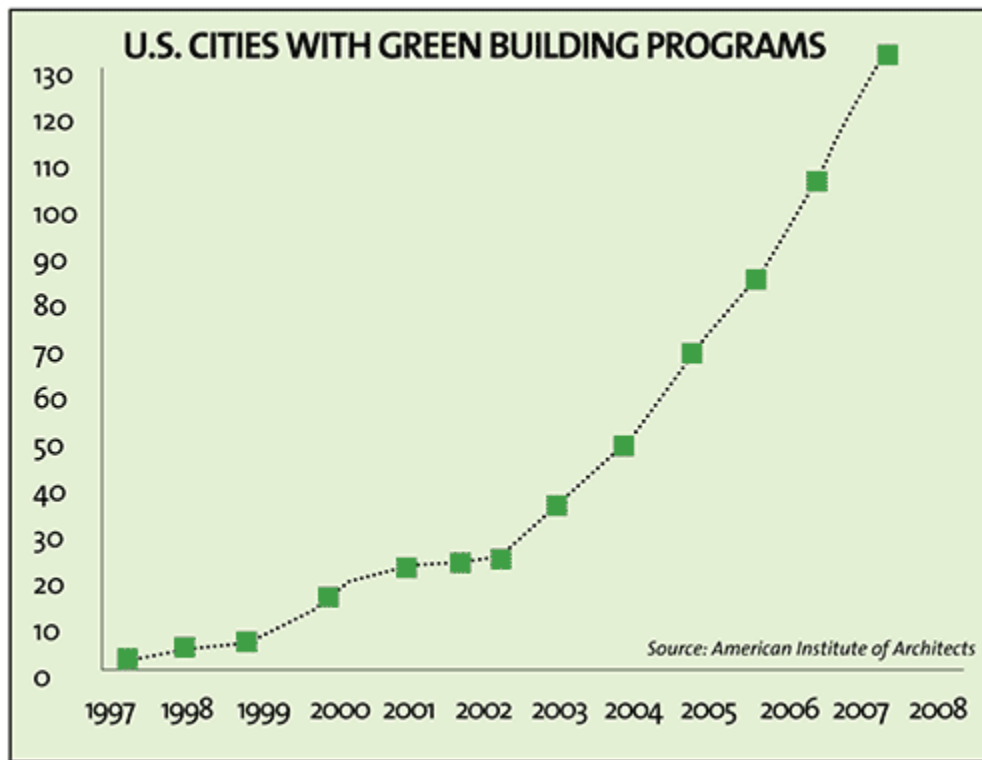
The forests of the United States are very diverse in composition and range from the oak-hickory and maple-beech-birch forests of the North to the South's pine forests and the Douglas-fir and ponderosa pine forests of the West. While many consider the vast majority of forest land to be in government or corporate ownership, the fact is that 60 percent of all the wood harvested in the U.S. actually comes from family forestlands. Ownership patterns of forest land vary: public ownership is predominant in the West; private forestland predominates in the East.

The American Tree Farm System (ATFS) was first launched in 1941 as an initiative to address concerns that America's privately-held forests were being cut at unsustainable rates without reforestation. It now represents more than 90,000 family forest owners in 45 states, most of whom manage woodlots of less than 100 acres. ATFS is the largest private forest conservation and forest restoration initiative in the history of the United States, with the number of certified family forests landowners in the system doubling over the past four years. A national program of the Center for Family Forestry, ATFS promotes the sustainable management of forests primarily through education and outreach to private forest landowners. ATFS private forest landowners manage their forestlands for wood, water, wildlife, and recreation with assistance from 4,400 volunteer foresters.

In August 2008, Geneva-based PEFC endorsed the American Tree Farm System after a 14-month review intended to assure purchasers that certified wood and paper products are produced from sustainably-managed forests. The endorsement will open up the rapidly growing marketplace of green manufacturers, distributors, retailers and consumers to the ATFS family forest owners, qualifying them for access to the international markets that they never had before. Family forestlands are losing 1.5 million acres per year to development annually. These new markets will help small landowners achieve some economic return on their property — essential incentive to avoid development pressures.

#### Canadian Standards Association

A leading developer of standards and codes, the Canadian Standards Association is a not-for-profit, membership-based association serving industry, government, consumers and other interested parties in Canada and the global marketplace. In terms of forest certification, CSA worked with diverse stakeholders to develop Canada's National Standard for Sustainable Forest Management to formulate a voluntary standard that links adaptive forest management to forest certification through performance requirements, public participation requirements and system requirements. The organization has certified some 60 percent of the country's forests.



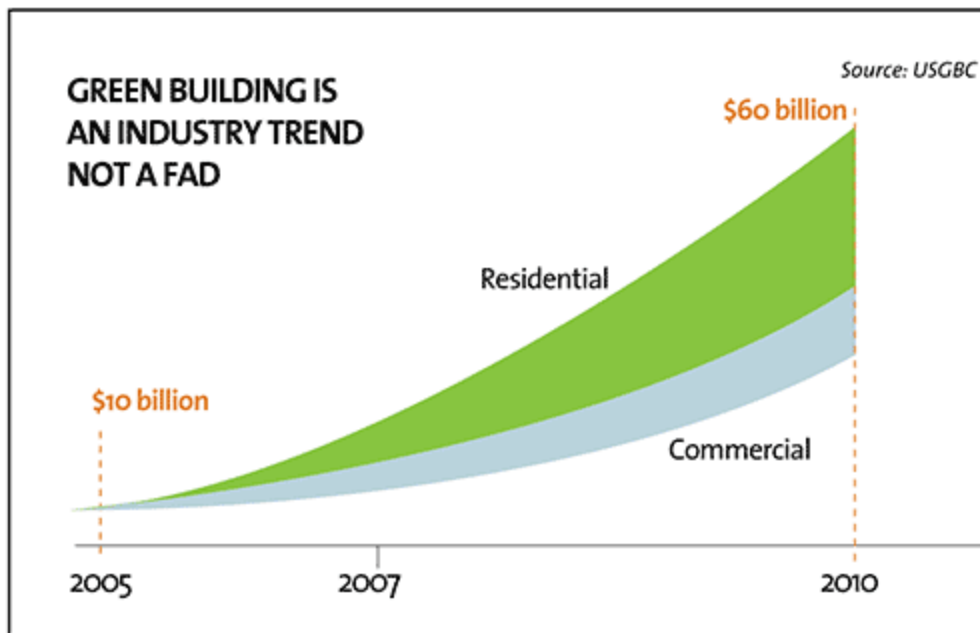
#### Certified Wood and Green Building

Green building is here to stay. Statistics show a tremendous surge in green construction — from \$10 billion to \$60 billion in just five years — and a steep rise in the cities with green building programs. With the increase in green building has come a proliferation of a green rating systems geared to awarding points for aspects of sustainable design. All are intended to promote buildings that are better for the environment, healthier for occupants and more cost-efficient to operate, though approach and requirements differ, particularly when it comes to defining certified wood.

#### Leadership in Energy and Environmental Design (LEED)

Developed by the U.S. Green Building Council (USGBC), the Leadership in Energy and Environmental Design (LEED) is the dominant rating system in the United States and is being adapted for use in other countries. There are several versions of the LEED rating systems tailored to various types of projects. Rating systems for residential and commercial projects are briefly addressed below. LEED-H, or LEED for Homes, is a rating system that promotes sustainable design and construction of high-performance green homes. Focused on the top 25 percent of the most environmentally conscious builders in America, the system has rigorous requirements and stringent standards of proof of compliance with those requirements. Evaluation of homes is made in the following areas: location and linkages, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental air quality, and awareness and education. Points are also given for innovation and the design process.





LEED-NC, LEED for New Construction and Major Renovations, evaluates projects in many of the same categories with the exception of location and linkages and awareness and education. A possible 69 points can be achieved; the lowest level, "certified" requires between 26 and 32 points, while the highest status, platinum, requires 52-69 points.

FSC is currently the only certified wood system accepted by LEED. Although considered the touchstone of all certification programs with the most stringent requirements, there is growing support for the sentiment that FSC should not be the only LEED-approved system. USGBC began to re-examine its wood certification in 2006, when it charged the LEED Steering Committee to study the question and propose revised credit language, if appropriate. Study has been underway ever since, with input from diverse stakeholders, and the support of experts from the Yale Program on Forest Policy and Governance and Life Cycle Assessment experts at Sylvatica. According to the newly proposed credit language, wood certification systems would be evaluated for eligibility to earn LEED points under the following categories:

- Governance
- Technical/Standards Substance
- Accreditation and Auditing
- Chain of Custody and Labeling

Wood certification programs deemed compliant would be recognized by LEED, while those not in compliance would receive an understanding of necessary modifications to receive LEED recognition. Once approved by member ballot, the revised credit language, expected in Fall 2009, becomes the basis of credits dealing with wood certification for all projects registered postcredit ratification. The credit will also be available as an alternative compliance path for all pre-LEED 2009 rating systems that include explicit reference to the FSC.

#### National Association of Home Builders (NAHB)

In February 2008, the National Association of Home Builders (NAHB) unveiled its National Green Building Program. Developed by a stakeholder group of nearly 60 builders, environmentalists, government agencies and product manufacturers, the guidelines provide a national baseline for practical green building approaches for the residential construction industry and can be adapted by home builders in any region of the country. NAHB Residential rating system features standards of proof designed to make the program verifiable but not burdensome to participate in. Generally, a pre-construction plan review, site visits and documenting receipts and photographs are required, with minimal third party oversight.



Green goes mainstream.

Photo courtesy of JELD-WEN® Windows and Doors

In terms of certified wood, the NAHB requirements are found in Section 2.6, which refers to the use of renewable materials. Section 2.6.1 awards points for materials manufactured from renewable resources, including wood-based products. Section 2.6.2 calls for the use of wood products certified by credible third party certification sources, including SFI, ATSF, CS and FSC and PEFC, and —other such credible programs as they are developed and implemented."

#### Green Globes

The Green Globes rating system was adapted from the Canadian version of the UK's Building Research Establishment Environmental Assessment Method (BREAM), and was released by the Green Building Initiative in the United States in 2005. Green Globes, which is a commercial project management tool, includes an assessment protocol, rating system and guide for integrating environmentally friendly design into commercial buildings. It also facilitates recognition of the project through third-party review and assessment. Like LEED, Green Globes awards points for sustainable design in a number of categories, specifically, site, water, energy, resources, indoor environment, emissions, effluents and other impacts and project management. References to certified wood can be found in Green Globes Commercial Section E.1, Low Impact Systems and Materials, which calls for selecting materials with the lowest life cycle burden and embodied energy for foundations, floor assemblies, columns and beams or post and beam and walls; roof assemblies; and other building envelope materials. Section E.2, Minimal Consumption of Resources, advises to "use lumber and timber panel products that originate from certified and sustainable sources." The guidelines specifically mention CSA, FSC and SFI.

After evaluating the various certification and green rating programs, a natural question might be: is there a data base that lists actual certified wood products? The Yale Program on Forest Policy and Governance suggest that potential buyers of certified products start with the following databases:

- [www.certifiedwoodsearch.org/sfiprogram/searchproducts.aspx](http://www.certifiedwoodsearch.org/sfiprogram/searchproducts.aspx)
- [www.certifiedwoodsearch.org/searchproducts.aspx](http://www.certifiedwoodsearch.org/searchproducts.aspx)
- [www.fsc-info.org/](http://www.fsc-info.org/)
- [www.environmentalhomecenter.com/](http://www.environmentalhomecenter.com/)

The non-profit environmental organization Metafore maintains a certified forest product search tool that enable users to find products certified under the Canadian Standards Association, Forest Stewardship Council and Sustainable Forestry Initiative programs. Metafore is also working to include product data for the Programme for the Endorsement of Forest Certification. See [www.metafore.org](http://www.metafore.org) for further information.

The green building and certified wood programs are not a fad. Both have grown exponentially over recent years. With the public's increasing interest in environmentally sound structures, the move is on for architects to keep abreast of the certification programs and green rating systems to make responsible, informed choices that support sustainable building.



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