Building to Benefit the Environment

The Role of Oregon Wood Products in the Green Building Movement

A Special Report of the Oregon Forest Resources Institute

"Green building is exploding in Oregon." That's the assessment of Jeremy Rogers of the Oregon Business Council. The council sees the movement not just as a social or cultural phenomenon, but as an economic priority of the Oregon Business Plan, a statewide strategy for economic prosperity launched by business and elected leaders in 2002.

Beyond what it says about Oregonians' tradition of concern for the environment, the green building movement is an economic driver with the potential to create jobs and stimulate economic growth. And because wood products have long been central both to the construction industry and Oregon's economy, there is a strong potential for synergy between the state's green building and forest sectors. This report explores that potential, some of the challenges to be addressed, new research on wood as a green structural building material for residential applications, and efforts on a number of fronts to create a collaboration that will benefit both the green building movement and Oregon wood products.

HIGHLIGHTS

- Oregon is the No.1 softwood lumber producer in the nation. The forest sector is central to the state's economic vitality as its second-largest traded sector, producing income for goods and services sold to other states.
- The green building movement has emerged as a vibrant, new economic sector in Oregon with significant growth potential, both inside and outside the state's borders.
- For residential applications, wood compares favorably to other structural building materials such as concrete and steel on a variety of environmental indicators, including carbon emissions and energy and water consumption, according to a multi-year life cycle assessment by the Consortium for Research on Renewable Industrial Materials.
- For commercial buildings, all wood products grown and manufactured in Oregon may be eligible for two of the green building rating points offered by the U.S. Green Building Council's LEED™ rating system, including the points for locally harvested and manufactured materials.
- The majority of Oregon's wood production cannot earn the one LEED point for environmentally responsible forest management because the building council's rating system only recognizes forests certified by the Forest Stewardship Council.
- Many of Oregon's larger forest products producers maintain that the FSC certification system is not economically viable in the Pacific Northwest. Other producers add that, regardless of certification, their forests should be recognized by green building systems for complying with the stringent environmental standards of the Oregon Forest Practices Act.
- Synergy between Oregon's well-established forest sector and the new green building sector could open up exciting new economic opportunities.
- Constructive dialogue is underway on many fronts to address obstacles to increased use of wood in meeting green building standards, and to recognize the environmental benefits of wood produced in Oregon.

Preface

This special report takes a "snapshot" look at the role of Oregon wood products in the green building movement, at opportunities for linking the forest and green building sectors to benefit the state, and at obstacles that must be addressed to achieve this synergy. This information is presented in two distinct, but related, sections:

Part 1 looks at green building standards and practices, including the role of forest management certification in green building criteria. It distinguishes between structural and non-structural applications and addresses evolving commercial and residential standards.

Part 2 summarizes what is known about how wood compares to alternative building materials for residential applications, such as concrete and steel, in terms of environmental effects. It concludes with a discussion of efforts underway to better integrate locally produced Oregon wood products with the goals of the green building movement.

This report is a snapshot, because the green building movement is part of the modern journey toward sustainability, and some of the information presented is unique to this point in time as researchers, building designers and policymakers attempt to sort out facts, values, standards and measurements that are most useful in achieving sustainability goals.

Part 1: What Is Green Building?

Over the past decade, energy use and other environmental effects resulting from the "built environment" have captured the public interest. The term "green building" has migrated from its status as sector jargon within the architectural and building communities to mainstream consciousness, and the attention is well deserved. According to the U.S. Green Building Council (USGBC), buildings in the United States account for 72 percent of national electricity consumption, 39 percent of other energy use, 38 percent of carbon dioxide emissions and 40 percent of raw material use – not to mention waste output, water consumption and other environmental impacts.

Green building has come to describe a movement advocating building design, building materials and construction practices that minimize negative effects on the environment. Toward that end, architects, engineers and contractors use a range of design techniques to reduce energy consumption, increase recycling and improve overall function and occupant health.

The Oregon Business Plan (OBP) affirms Oregon's aspiration to be a national leader in the green building movement. It states, "Oregon is taking the lead in

Jennifer Allen
Acting Director, Center for Sustainable Processes and Practices
Portland State University
Portland

"My policy interests focus around green building and sustainable economic development, which explains my interest in the vibrant green building movement here in Oregon and the progressive forest sector of its economy. When it became apparent that Oregon's wood products community and green building community were not able to take full advantage of the potential synergies between their respective industries, I saw an opportunity for dialogue. Discussions that ensued were frank and constructive, illuminating areas of agreement and disagreement. They ranged from economics and carbon issues to the threats of development and keeping forestlands in forest. This is a state where these kinds of issues can be constructively aired, which is always the first step in creative problem solving."

THE BUILT ENVIRONMENT

The phrase "built environment" refers to the man-made surroundings that provide the setting for human activity. The term also is used widely to describe the interdisciplinary study of the design, management and use of these man-made surroundings, including consumption of resources, disposal of wastes, facilitation of productive enterprise and impact on population.

green building, with Oregon-based firms exporting their expertise on projects well outside our borders." Oregon's tradition of innovative environmental policy, its early investment in energy efficiency, and influential architecture faculty at the University of Oregon – who have trained thousands of students in energy efficiency design – have blazed a trail for Oregon's leadership in the green building movement. As for selection of green building materials, the role wood plays in construction has special resonance here. Oregon has been a national and international leader in forestry and wood products for decades and remains so today. As Part 2 of this report will show, there is a growing body of scientific evidence that the "environmental footprint" of wood measures up quite positively when compared to alternative structural materials such as concrete and steel, especially for smaller commercial and residential applications.

Oregon's Green Building Movement

The roots of Oregon's green building movement go back at least to the late 1970s, when Portland General Electric (PGE) began assisting customers with energy conservation in their homes. In the mid 1990s, PGE developed the Earth Smart commercial building and residential programs. These programs soon expanded beyond energy, introducing a rating system for energy efficiency, indoor air quality, environmental responsibility and resource efficiency. In the late 1990s, PGE created a "Green Building Services" team to work with the commercial building sector.

In 1999, the Cascadia Region Green Building Council (CRGBC), with offices in Portland and other locations, incorporated as one of the three original chapters of the USGBC. It serves an area that encompasses Oregon, Washington, British Columbia and Alaska. CRGBC is a co-creator of the Pharos Project, an effort to build a Web-based consumer materials guide providing a "nutrition label" or environmental content verification for building materials. Cascadia's current efforts also are directed at its "Living Building Challenge" to encourage ultra low-impact, high-efficiency projects that may serve as models for wider spread residential or commercial development. With a goal of net zero environmental impact, a building's energy and water would be supplied by on-site renewable sources.

Another group promoting environmentally sustainable building practices, the Green Building Initiative (GBI), is also based in Portland. Established in 2004, it has evolved into a national organization, advocating energy-efficient, healthful and other green building approaches for residential and commercial construction in dozens of major cities across the country. GBI is the U.S.-based licensee of

the Green Globes™ environmental assessment and rating system for commercial properties developed in Canada by ECD Energy and Environment Canada.

State Efforts Led the Way

State government recognized early the importance of energy conservation, renewable energy and sustainability, issues that have become priorities of the green building movement. "Oregon's building energy code has long been among the most stringent in the country," said Gina Franzosa, Oregon CRGBC state director. Oregon pioneered the Business Energy Tax Credit (BETC), which Franzosa calls an excellent stimulus for all who build green buildings – institutions, developers, and nonprofits alike. "It's unlike just about any other incentive for green building and has brought substantial economic benefit to the state," she said. Today, work is being done in Oregon to advance the next round of innovation in building codes and incentives at the city, county and state levels.

More recently, carbon is being used as a measurement of net environmental impact. In 1997, Oregon became the first state in the nation to set carbon dioxide emission offset standards for new power plants, and helped spawn independent initiatives such as the Climate Trust to help meet carbon offset requirements. Oregon's forests and forest products are carbon "sinks," contributing to net reductions of carbon dioxide from the atmosphere, and the Climate Trust has brokered investments in state afforestation and reforestation projects as carbon offsets, as has the Forest Resource Trust.

On the alternative energy front, the Oregon Department of Forestry joined the Oregon Department of Energy in seeking ways to increase the use of woody biomass (e.g., by thinning overly dense forest stands, using mill byproducts, etc.) to help generate electricity, biofuels and other products to foster this abundant source of renewable energy.

The Growth of Green Building Rating Systems

In the late '90s, the USGBC introduced its trademarked criteria and rating system known as LEED™ (for Leadership in Energy and Environmental Design) that set standards for labeling a green building. LEED uses design guidelines and third-party certification in an effort to improve "occupant well-being, environmental performance and economic returns" for new commercial construction, major renovations and high-rise residential buildings. Building projects earn individual points on a discretionary basis toward certification by meeting a variety of requirements in sustainable site development, water and energy efficiency, atmospheric protection, materials selection, indoor environmental quality and design innovation. Depending on the number of points earned, up to a maximum of 69, projects achieve a rating of certified, silver, gold or platinum.

Christine Theodoropoulos
Head, Department of Architecture
School of Architecture and Allied Arts
University of Oregon
Eugene

"In the '70s there was a movement toward low-tech architecture – designing buildings to take advantage of natural forces in order to lessen dependence on fossil fuels in shortages. Some ways were science-based, acknowledging the influences of wind, sun and so on. Some were vernacular-based – how did people do it before air conditioning? It's similar now, not only related to the cost of oil, but about what we're doing to the environment. Many architects who were trained in '70s ideals are now in charge of departments and are helping shape thinking."

Jeremy Rogers
Project Director
Oregon Business Council
Portland

"One of the values of the Oregon Business Council is its ability to function as a convener and facilitator. We're in a unique position to see an issue from multiple perspectives, and we are often a resource for legislators, planners and the governor's office. We saw how active the green building cluster is in Oregon and the number of Leadership in Energy and Environmental Design buildings that have gone up here. We are also well aware of the value of the forestry cluster to Oregon's economic health. OBC believes that there is tremendous opportunity for these two clusters to work together for Oregon's economic benefit. That's why we devoted part of the annual Leadership Summit in 2007 to forestry and green building."

The number of LEED-certified buildings has exploded during the past 10 years, increasing from 2 percent to 20 percent market share, according to Jerry Yudelson, a Tucson, Ariz., green building consultant and author who spoke in February 2009 as part of the Starker Lecture Series held at the Oregon State University (OSU) College of Forestry. Yudelson, who as a national faculty member for the USGBC has trained 3,500 people in the LEED rating system, said there are currently 2,200 LEED-certified buildings worldwide, with another 17,000 currently in development.

Historically, Oregon has been a national leader in LEED-certified buildings (currently with more than 100, which places it among the top five states). Examples include the new Oregon Health & Science University Center for Health & Healing, the world's largest platinum-rated building, and the Gerding Theater in Portland's Pearl District, which was the first building listed in the country's National Register of Historic Places to receive a platinum rating.

With a later start, Green Globes counts 57 commercial buildings certified to its rating system nationwide, and one in Oregon. However, in Canada, where Green Globes originated, more than 1,000 buildings are certified to the Green Globes standard. According to GBI President Ward Hubbell, "Having more than one rating system helps to drive improvements and lower costs. It's good for building owners and developers, who benefit from access to more options for green certification, and it's good for the environment because it encourages a greater number of people to design and build green."

A comparison of LEED and Green Globes conducted by researchers at the University of Minnesota in 2006 concluded that 80 to 85 percent of the available rating points were addressed by both systems, with Green Globes placing more emphasis on energy use and LEED allocating comparatively more points to material selection. Despite the similarities, LEED today is the dominant rating system in the United States in terms of market adoption.

To date, much of the green building movement has focused on commercial buildings, but new developments are occurring in the residential sphere. In January 2008, the LEED for Homes rating system was released. One month later, the National Association of Home Builders (NAHB) unveiled a program called the National Green Building Program, or NAHB Green. NAHB's goal is to reach residential developers and builders and spur the growth of green building in the housing sector by encouraging energy efficiency, water and natural resources conservation, use of sustainable or recycled products, and improving indoor air quality.

In early 2009, the NAHB green building standards were approved by the

American National Standards Institute (ANSI) following a yearlong process that involved debate and consensus by a representative committee, public hearings and evaluation of more than 2,000 public comments. Approval is significant as this is the first green building rating system to be approved by ANSI. Both Green Globes and LEED are also pursuing ANSI approval of national green building standards.

Oregon Wood Products & Green Certification

Nearly all commercial buildings in Oregon seeking a green label have pursued LEED certification. Among other things, LEED gives points for selection of certain materials. When it comes to lumber and wood products, points are awarded for using locally harvested or manufactured wood, engineered wood products such as I-joists with 5 to 10 percent recycled content, "rapidly renewable materials" coming from short rotation fiber crops (e.g., hybrid poplar) and wood certified by a third party as sustainably grown and produced.

Oregon architects, builders and their clients interested in green building can earn one LEED point for using a minimum 20 percent of building materials and products manufactured within a 500-mile radius of the project site. A second LEED point can be earned for using a minimum 50 percent of building materials and products that are extracted, harvested or recovered within a 500-mile radius. Oregon wood products easily meet these "locally sourced" criteria, and not just for Oregon-based projects. A 500-mile radius circle drawn around either Seattle or San Francisco, both centers of green building, includes almost all of Oregon.

However, according to Gary Lettman, principal forest economist with the Oregon Department of Forestry, just one-third of Oregon's forest products (including paper) is consumed in state. Oregon exports most of its lumber, with California accounting for about 29 percent, and the West (Washington, Oregon, Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico, Alaska and Hawaii) accounting for 45 percent. Less than 1 percent is exported out of the country, leaving about 25 percent to other states. Lumber used at project sites more than 500 miles from Oregon would not be eligible for the locally sourced LEED credits.

A sticking point for many Oregon landowners is that the bulk of Oregon wood does not qualify for the LEED standard for certified wood, that is, wood certified by a third party as grown and harvested in an environmentally and socially responsible manner. To receive this LEED point, wood products used on the project must meet Forest Stewardship Council® (FSC) certification across the supply chain. Forests certified by the Sustainable Forestry Initiative® (SFI),

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"Sustainability is a slippery concept. The deeper I look into comparing materials, the more complicated and the less clear the whole picture becomes – and I'm teaching the subject! That's why it's so important to get architects and those involved in green building together to look at wood and all materials selection in terms of environmental benefits and costs. For those of us involved in surveying and getting the region's architects together to discuss green building materials, we feel it's extremely important to our goal of environmentally responsible decision making."

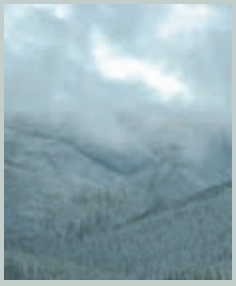
the largest forest management certification program in the United States with around 150 million acres certified, do not qualify for this point, nor do forests certified by the American Tree Farm System® (ATFS) with around 24 million acres certified. By comparison, FSC certified forests amount to 28.3 million acres nationwide. There are no points given for highly regulated forests, such as private forests meeting the environmental requirements the Oregon Forest Practices Act.

Forest Certification Systems in Oregon

All forest operations, regardless of ownership, must meet state and federal environmental standards. In addition, some forestland owners choose to have their operations certified by a third party to even more rigorous standards. The three major certification systems mentioned above are represented among Oregon's 30.5 million acres of forestland (see sidebar). The majority of forestland in Oregon, 86 percent, is not certified by any system. That's due, in part, to the large state and federal ownership (60 percent of Oregon forestland is owned by the federal government), which is not certified. About one-third of the state's 10.6 million acres of private forestland, comprising both large and small landowners, is certified. Of the various certification systems, as of the end of 2008, SFI is the most used, covering 2.5 million acres, with a single owner, Weyerhaeuser, accounting for about 44 percent of that total. Other large Oregon landowners that are SFI-certified, with 100,000 acres or more, include Forest Capital Partners, Green Diamond Resource Company (since acquired by the Hancock Timber Resource Group), Plum Creek Timber Company and Stimson Lumber Company. ATFS certification comprises nearly 1 million acres, representing 722 certified tree farms. FSC-certified forests total 557,570 acres, with three-quarters of that amount, 441,000 acres, represented by the Confederated Tribes of the Warm Springs Reservation of Oregon. A large, private ownership certified under FSC is the 79,000 acres in southern Oregon and northern California managed by The Collins Companies.

FSC certification standards for Oregon are met in many low-volume, drier pine and mixed conifer forests that occur east of the Cascades and in southern Oregon. But, for the wetter, highly productive Douglas-fir forests west of the Cascades, FSC restricts certain practices permitted under the Oregon Forest Practices Act, limiting management options.

One of the variables on which forest certification standards differ is clearcutting (a harvest method in which most of the trees are removed and the forest is regenerated by planting new trees). While all of the major certification systems allow clearcutting, the FSC Pacific Coast Standard limits clearcuts to openings of 40 acres while SFI allows openings of 120 acres.



CERTIFIED FORESTS IN OREGON 2008 (ACRES)

Forest Stewardship Council	557,570
American Tree Farm System	959,000
Sustainable Forestry Initiative	2,521,494
Non-certified Private	7,045,422
Non-certified Public	19,337,300
Total Oregon Forestland*	30,472,000

*Data references listed in Appendix

Oregon Forest Practices Act

In 1971, Oregon became the first state in the nation to enact a comprehensive law governing forest practices and safeguarding forest resources, including water, fish, wildlife, soil and air. The first set of rules was implemented in 1972 and has been updated periodically to keep pace with findings from current research and field monitoring.

Landowners must complete replanting within two years after harvest. Within six years, the harvest area must regenerate into a healthy stand of trees that can outgrow competing grass and brush.

Timber harvesting, road building and the use of herbicides are restricted close to streams to protect fish and drinking water.

Live trees, snags and fallen logs must be left after harvest to provide structure for wildlife habitat.

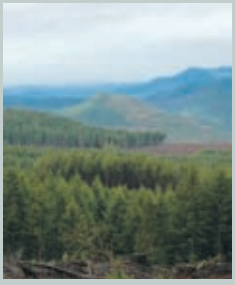
Except when approved under special conditions, a clearcut cannot be more than 120 acres. Clearcuts within 300 feet of each other cannot total more than 120 acres on the same ownership.

In addition, laws govern road construction, bridge and culvert placement, public safety, stream enhancement, wildlife protection, and a host of other considerations. For a complete examination of Oregon's forest protection laws, please see the special report, *Protecting Oregon's Forests* (oregonforests.org).

Other differences in certification standards exist as well, and there has been a great deal of debate in recent years about the relative merits of the various systems. About that debate, Hal Salwasser, dean of the OSU College of Forestry and former chair of the National Commission on Science for Sustainable Forestry said, "These certification programs are market-based systems of product differentiation that use science to support and measure their criteria, but they also reflect the social values of those who develop and use them. For example, all have constraints on the size of forest clearings created by timber harvest, as does the Oregon Forest Practices Act, but clearcut size restrictions reflect social values such as preferred wildlife habitat or aesthetics. Nature does not restrict the size of openings caused by disturbances such as fire or storms. And science cannot deliver a hard and fast rule for how big or how small openings should be absent a clear statement of desired social objectives."

Cassie Phillips, vice president of sustainable forests and products at Weyerhaeuser, said that FSC certification standards vary from region to region around the nation and the world. In North America alone there are 13 different FSC regional standards. In other parts of the United States and much of the world, FSC allows the very practices it discourages in Oregon, yet this wood can be imported for use in LEED-certified buildings.

In 2007, the Yale Program on Forest Policy and Governance published a report titled *Assessing USGBC's Forest Certification Policy Options*. Its purpose was to assist the USGBC in deciding which forest certification system or systems ought to qualify for inclusion within the LEED green building rating system. According to the authors, forest certification is relevant to all of the LEED



WHY CLEARCUT?

Though clearcut sizes differ, west of the Cascades, forest landowners managing for wood production commonly choose to clearcut because, among other reasons, Douglas-fir seedlings thrive in full sunlight. Oregon law requires that new trees be planted within two years after harvest, that forested buffers be retained around streams and that other trees be left for wildlife habitat.

Selective harvest (a method in which many trees are retained and replanting may not be required due to natural regeneration) is more successful on seasonally warm, dry sites, such as those found in eastern and southwest Oregon. Where clearcutting provides sun needed to effectively regenerate westside forests, selective cutting in eastside forests provides young trees with shade that protects them from temperature extremes.

points available for wood use because, it provides "proof of environmentally and socially responsible wood production and verification that the wood used is a renewable resource."

The report listed some of the concerns that stakeholders have with LEED's current FSC-only certification standard, noting that:

- There is no clearly identified rationale for this approach
- Only a limited amount of FSC-labeled product is currently available today
- A "yes/no" tool is applied to what, in reality, is a continuum between environmentally destructive forestry practices on the one hand and exemplary "eco-forestry" on the other
- There are no consistent controls on non-certified wood or on policies for use of other bio-based materials.

The report did not advocate for a particular forest management system but did analyze existing systems and their impacts. To meet USGBC's goal of rewarding responsible forest management, the report said LEED itself could continue to choose which certification systems meet its forest management requirements. It also posed another option: Use a benchmark approach to identify, criterion by criterion, exactly what is required for a certification system to achieve recognition in LEED. "The idea behind a benchmark approach," the report stated, "is that these benchmarks would exist/function independently of the certification systems being evaluated." Such an approach would allow USGBC to focus on the substance of certification standards and not the systems themselves.

To date, the question of suitability of different forest certification systems as a basis for inclusion in green building rating standards has not

Ken Faulk
Landowner and President, Oregon Small Woodlands Association
Philomath

"As a small woodland owner, I've followed the certification issue closely and looked at all the programs. I'm a strong believer in sustainable forestry, and the certification program that best met my management goals is the American Forest Foundation's American Tree Farm System. It is recognized by the mills in my region, which can process my wood along with Sustainable Forestry Initiative-certified wood from larger suppliers. It is also my choice because I'm interested in the new carbon credit systems, and this program enables me to establish baseline criteria for my land and qualify for carbon credits when I demonstrate net growth in trees and the resultant increase in carbon sequestration."

Forest Certification Programs

While Oregon forestland owners must comply with state and federal forest protection and environmental laws, they may also voluntarily meet additional forest management standards by enrolling in a forest certification system. These private, independent programs provide consumers with credible evidence of well-managed forests through rigorous standards, third-party audits and management transparency. The evidence of this is often documented by an "ecolabel."

Among some 40 different certification programs worldwide, the three largest systems in the United States are the Sustainable Forestry Initiative®, the Forest Stewardship Council® and the American Tree Farm System®. Both SFI and ATFS were initiated by forestland owners; FSC was begun by groups seeking an independent body to measure forest sustainability.

A 2001 study by OSU professors Paul Adams, Rick Fletcher and Steve Radosevich compared the Oregon Forest Practices Act with the certification requirements of both FSC and SFI. Each of these systems was evaluated as more rigorous on some standards and less rigorous on others.

Both SFI and ATFS are endorsed by the international Programme for the Endorsement of Forest Certification, based in Europe and the largest certification program in the world, comprising 25 national programs and more than 1 million kilometers of certified forests.

been particularly troublesome for Oregon wood producers. As mentioned, most green building activity has focused on larger commercial buildings, and wood has not been a primary building material in these high-rises for structural reasons. In many cases, wood in buildings more than five stories constitutes less than 1 percent of the total building materials used and is most often found in decorative applications.

However, wood is the most prevalent structural material for single-family and most multi-family residential projects. Oregon is the nation's top supplier of lumber, but with insufficient FSC-certified framing lumber available regionally to meet housing construction demand, the issue of certifying forests to meet green building standards is taking on new relevance. Additionally, setting aside the issue of certification, many Oregon landowners feel that if they are meeting the rigorous requirements of the state's Forest Practices Act, then their products should receive credit for coming from forests that are managed in an environmentally responsible manner. Many of these same landowners are also participants in the voluntary Oregon Plan for Salmon and Watersheds to restore fish habitat and water quality.

To architect Clark Brockman, associate principal and director of sustainability resources for SERA Architects in Portland, one solution is for more Oregon forest landowners to explore becoming FSC certified because of the value proposition afforded by the green building movement. "Oregon's economic development agencies should assist them in this effort, and state and federal stimulus funds should be considered because it could be an economic development opportunity for Oregon forest products to better leverage Oregon's strong green building brand," he said.

Matt Donegan, co-president of Forest Capital Partners, maintains that, "Our focus should be on capturing strategic advantage from our strong environmental regulations, which heretofore have presented disadvantages due to the added costs that Oregon producers incur. The green building movement presents an opportunity to harness the power of markets to promote sustainable forestry, but the FSC only requirement in LEED currently presents an obstacle we need to overcome." Forest Capital Partners, one of the largest private forestland owners in Oregon, has the resources to meet wood demand, but Donegan said that becoming FSC certified is not economically viable.

According to another Oregon forest landowner, adopting current FSC standards for Oregon would result in a significant drop in wood production from private forests. Steve Zika, president and chief executive officer of Hampton Affiliates – which manages 85,746 acres of SFI-certified forests – said moving

Clark Brockman
Associate Principal
Director, Sustainability Resources
SERA Architects, Inc.
Chair, Cascadia Region Green Building Council Board of Directors
Portland

"The Pacific Northwest has been called by some 'the epicenter for green building in America,' and it certainly has one of the greatest densities of green building expertise in the country. I think we need more open discussions, so that we can identify where we agree and disagree. We need to look past the forest certification debate and move on to areas of likely common agreement – such as the importance of locally grown and manufactured wood products, carbon issues and energy savings – and then work toward a discussion of ecological sustainability. This sort of dialogue is the essence of the continuing pursuit of sustainability, and I believe it is common to both the green building and wood products industries."

to the FSC standard would require the United States to increase its use of imported wood or less environmentally friendly alternatives to meet housing needs. At the very least, he said, adopting FSC standards could make companies such as Hampton, an Oregon fixture since 1942, noncompetitive.

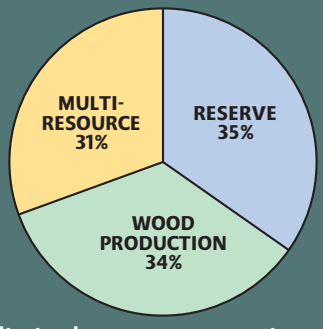
Brockman is sympathetic to the dilemma, but feels the problem is beyond his expertise. "I am committed to green building," he said, "but my expertise is not in evaluating whether 'Oregon forestry' is sustainable or not. LEED right now is the dominant green building standard. Oregon has the highest density of LEED commercial buildings per capita followed closely by Seattle. LEED is growing in popularity throughout the West Coast. As Oregonians, we should set aside the debate about forest certification – which is only one point in the LEED system – and focus our attention on the two points for locally grown and manufactured wood. That's the economic development opportunity in front of us today."

Oregon is but a microcosm of the larger forest certification debate, which is being played out on a much larger stage. Efforts are underway at both state and national levels to address the issues surrounding the use of forest certification systems in choosing green building materials. Following on the heels of the Yale study, the USGBC last fall solicited public comments on proposed changes in how the LEED Green Building Rating System™ awards points for the use of certified wood. "The proposed evolution of the certified wood credit in LEED

David Morman
Director, Forest Resource Planning
Oregon Department of Forestry
Salem

"The Oregon Board of Forestry has had a sustainable forest management vision and objectives at the landscape level for decades, and has been out in front of the rest of the country in responsible forest management. We were the first state to enact a comprehensive forest practices act to mandate management practices that protect the environment and ensure long-term forest health. We were the first state to undertake an assessment of Oregon's forestry program based on the international standards and protocols prescribed for forest sustainability."

A Vision For Sustainable Forest Management In Oregon



The Forestry Program for Oregon (FPFO) adopted by the Oregon Board of Forestry envisions that the state's forests will be healthy and provide a sustainable flow of environmental, social and economic benefits. The FPFO acknowledges that different landowners play different roles associated with those three legs of the sustainability stool.

Reserve forests, presently 35 percent of Oregon forestland, are managed primarily for wilderness and older forest habitat, with timber production prohibited or limited to meet restoration or other resource goals. Multi-resource forests, 31 percent of Oregon forestland, have multiple benefits - wildlife habitat and recreation, for example - that also include timber production. Wood production forests, on 34 percent of the state's forestlands, include industrial and many family-owned forests that must comply with reforestation and other environmental protection requirements called for in the Oregon Forest Practices Act. A fourth forest type, urban and community forests, comprises less than 1 percent of the forested landscape, but acknowledges the value of trees and green space as improving the environment and quality of life for urban populations.

In the late 1990s, the Oregon Department of Forestry recognized the importance of sustainable forestry by making Oregon the first state in the nation to adopt international standards for assessing the sustainability of its forestland and for shaping forest policy.

will help focus the forest certification conversation on outcomes and performance," said Brendan Owens, vice president of LEED Technical Development, USGBC. During a March speech, Owens said that USGBC is redrafting the benchmark and hopes to conclude its work by the end of 2009.

Part 2 - Wood As A Green Building Material

A fundamental question to green building, and one that offers other possibilities for common ground between the green building and forest sectors, is how wood compares to other structural material options. In other words, how do these materials compare to each other when one considers all of the environmental costs involved in product manufacturing, use and disposal? Which building product has the lowest overall environmental impact? These are important questions for, as Portland architect David Horsley said, "As to green building, a view toward sustainability should be a part of every architect's work today."

To help answer these questions, a tool is available to architects, engineers, builders and planners interested in building green. Called life cycle assessment (LCA), the tool helps determine some of the environmental impacts of a product, process or service. The U.S. Environmental Protection Agency defines LCA as a technique to measure the environmental aspects and potential impacts associated with a product, process or service over its entire lifespan. It is computed by compiling a life cycle inventory (LCI) of relevant energy and material inputs and environmental releases, evaluating the potential environmental impacts associated with them, and interpreting the results to facilitate an informed decision.

A study conducted by the Consortium for Research on Renewable Industrial Materials (CORRIM) used LCA to examine wood, concrete and steel – three of the most common types of structural building materials in current use – for their environmental impact on residential applications. CORRIM is a nonprofit research collaborative formed in 1996 by 15 universities across the country, including OSU and the University of Washington (UW).

CORRIM grew from a 1976 study by the National Academy of Science and the National Research Council but, where that study focused solely on energy use, the new CORRIM study set out to expand the original work and reflect recent findings and processes, including overall effects on the environment. "We saw a need for a scientific database to help assess the performance of wood materials in terms of resource use, energy use, global warming, greenhouse gases, carbon storage and a number of other impacts," said James Wilson, professor emeritus of wood science and engineering at the OSU College of Forestry and CORRIM vice president (*Wood and Fiber Science*, December 2005).

Frances Bronet
Dean, School of Architecture and Allied Arts
University of Oregon
Eugene

"Wood is the ultimate building material and has been for centuries. Steel requires manufacturing and equipment to move it. You can take a piece of wood, carve it, carry it, plane and shape it, put some holes in it and turn it into a joist or truss. It's accessible; it reveals itself easily compared to more complex materials. It has fundamental multiple sensual qualities – there's something about it that humans can connect to. We have a deliberate curriculum here that requires our students to design a wood building. It's ideal for exploring the limits of a material."

Scott Leavengood
Director, Oregon Wood Innovation Center
College of Forestry
Oregon State University
Corvallis

"To its long reputation for excellence in forestry and quality forest products, Oregon has in the past decade or two added national leadership in the green building movement. Add to that the leadership in forest products research here at Oregon State University that helps us realize the highest levels of environmental performance and manufacturing efficiency. At the Wood Innovation Center, we try to provide environmentally conscious architects, engineers and builders with useful information about sustainably grown Oregon wood products to assist them with material selection, purchasing and specification."

The CORRIM Study Methodology

The CORRIM study, *The Environmental Performance of Renewable Building Materials in the Context of Residential Construction*, recognized the need for a useful guide for architects, engineers and others who specify structural building materials for residential applications, and compared wood to concrete and steel in terms of their LCI and LCA. To do so, CORRIM researchers selected two typical residential designs in two different climate regions to assess the use of alternative building materials in each region (Table 1). The researchers chose – using data from the U.S. Census Bureau and the National Association of Home Builders – two typical residential designs:

- Two nearly identical 2,062-square-foot homes in the cold Minneapolis climate, one designed with wood framing, the other, with steel.
- Two nearly identical 2,153-square-foot homes in the warmer and more humid Atlanta area, one with wood framing, the other, using concrete.

Minneapolis House

Atlanta House

Table 1

Quantities of raw materials required to manufacture the materials used in structures (excluding water, natural gas, oil, coal, but not metallurgical coal)

Raw material	Minneapolis House		Atlanta House	
Type of frame	Steel	Wood	Concrete	Wood
Limestone (kg)	10,333	9,775	11,590	9,518
Clay & Shale (kg)	2,496	2,496	2,916	2,269
Iron Ore (kg)	6,614	1,019	667	507
Sand (kg)	1,256	1,403	776	748
Ash (kg)	48	48	59	45
Other (kg)	4,571	4,666	3,956	4,505
Gypsum (kg)	1,712	1,712	5,721	5,621
Semi-Cementitous Material (kg)	728	728	1,057	1,057
Coarse Aggregate (kg)	24,687	24,687	35,997	35,871
Fine Aggregate (kg)	24,437	24,437	32,848	26,427
Obsolete Scrap Steel (kg)	1,361	971	874	291
Wood Fiber (kg)	6,595	12,993	8,191	9,811
Phenol Form. Resins (kg)	126	144	65	103
Metallurgical Coal (kg)	2,864	407	254	189
Prompt Scrap Steel (kg)	764	602	545	178
Total Material (kg)	**88,592**	**86,088**	**105,516**	**97,140**
Wood Fiber	7.4%	15.1%	7.8%	10.1%
Steel	13.1%	3.5%	2.2%	1.2%
Concrete Materials	72.2%	73.8%	80.7%	78.1%
Subtotal	92.7%	92.4%	90.7%	89.4%
Limestone	11.7%	11.4%	11.0%	9.8%

Table 2

Energy consumption by fuel type for the Minneapolis and Atlanta house designs

Raw material	Minneapolis house		Atlanta house	
Type of frame	Steel	Wood	Concrete	Wood
Electricity (kWh)	13,558	12,214	8,196	7,635
Hydro (MJ)*	10,266	13,248	4,729	5,143
LPG (MJ)	237	277	102	151
Diesel (MJ)	48,115	53,447	34,316	28,386
Gasoline (MJ)	278	392	236	275
Natural Gas (MJ)	161,350	163,177	94,110	86,509
Wood (MJ)	5,241	15,431	12,870	13,844
Coal (MJ)	201,622	179,685	144,850	112,895
Heavy Fuel Oil (MJ)	70,446	62,215	46,648	23,968
Nuclear (MJ)	53,077	45,621	38,856	32,273
Feedstock Fuels (MJ)	218,430	125,597	84,168	96,651
Total (Primary Fuels) (MJ)	**758,796**	**645,842**	**456,156**	**394,952**

*MJ = Megajoules

In this way researchers could establish LCIs and LCAs for wood and steel in the Minneapolis home and wood and concrete in the Atlanta house. Both the Minneapolis and Atlanta home designs adhered to the appropriate local building codes.

Because the fir-dominated forests of the Pacific Northwest and the pine-dominated forests of the Southeast are the nation's major suppliers of structural lumber, the researchers chose Northwest lumber for the Minneapolis house and Southeast lumber for the Atlanta house.

Assimilating the Data

Bruce Lippke, professor of forest resources at UW and CORRIM president, said one should imagine the flows of material into a residential house and then track the associated environmental burdens. Then imagine backing up and also tracking the flows of materials, energy and emissions for extraction and manufacture activities, not to mention transport to the site and the construction process itself. Add to that the tracking of energy for heating, cooling, maintenance and ultimately material disposal.

And for good measure, add the emissions produced in all stages, the waste generated and all the potential for contributions to climate change. This was the CORRIM study's criteria for LCA.

After setting the project's boundaries, researchers began the laborious task of identifying and quantifying energy needed, resource use and environmental effects in order to create LCIs for all wood products, services and other activities. This enabled them to assess potential environmental consequences of energy and natural resource consumption as well as waste production. They also looked into areas that presented opportunities for reducing environmental impacts.

FORESTRY: AN ECONOMIC MAINSTAY

"The forest products industry remains a mainstay of the state's economy, especially in rural communities. Oregon is a leading producer of lumber, panel products and millwork, including wood doors, windows and moldings. More than 60,000 people work in wood products manufacturing and forest management."

Policy Playbook: ***Keeping Focus in Tough Times,*** **2008 Leadership Summit, Oregon Business Plan**

IMPROVING ENVIRONMENTAL PERFORMANCE

"Using wood in more applications that substitute for fossil intensive products can substantially improve environmental performance. Wood offers unique opportunities to store carbon in the forest, products and substitution (avoided fossil intensive products), while also supporting other ecological services such as clean water, clean air, habitat and recreation."

corrim.org

How Wood Stacks Up

CORRIM researchers tabulated energy use for wood, concrete and steel through the construction process for both the Minneapolis and Atlanta houses (Table 2) and went on to measure environmental performance on some of today's front-page issues, including global warming emissions and other impacts to air and water. Wood had a considerably lower environmental impact than the alternatives (concrete and steel) for all but two of the indicators evaluated.

In the Minneapolis home design, it turned out that wood used 17 percent less energy than steel when wood framing replaced steel. In the Atlanta house, where wood was compared to concrete, the results were nearly the same with wood requiring about 16 percent less energy (Table 3).

Table 3

Environmental performance indices for residential construction

Minneapolis house Type of frame	Wood	Steel	Difference	Steel vs. wood (% change)
Embodied energy (GJ)*	651	764	113	17%
Global warming potential (CO2 kg)	37,047	46,826	9,779	26%
Air emission index (index scale)	8,566	9,729	1,163	14%
Water emission index (index scale)	17	70	53	312%
Solid waste (total kg)	13,766	13,641	-125	-0.9%
Atlanta house **Type of frame**	**Wood**	**Steel**	**Difference**	**Steel vs. wood (% change)**
Embodied energy (GJ)	398	461	63	16%
Global warming potential (CO2 kg)	21,367	28,004	6,637	31%
Air emission index (index scale)	4,893	6,007	1,114	23%
Water emission index (index scale)	7	7	0	0%
Solid waste (total kg)	7,442	11,269	3,827	51%

*GJ = Gigajoules

The study then performed the same comparisons, but limited them to the above-grade walls, where the design changes from wood to concrete or steel (the performance indices discussed above included the whole house). The results were even more dramatic.

Relative to environmental performance, wood performed between 11 percent and as much as 867 percent better than concrete or steel in eight of the 10 indices in Minneapolis and Atlanta combined (Table 4). The two exceptions were: steel and wood designs produced similar amounts of solid waste in Minneapolis, and concrete and wood designs produced similar water pollution impacts in Atlanta. For environmental performance indicators such as global warming potential, air and water emissions, and solid waste, wood scored better than concrete or steel.

Table 4
Environmental performance indices for above-grade wall designs

Minneapolis house Type of frame	Wood	Steel	Difference	Steel vs. wood (% change)
Embodied energy (GJ)	250	296	46	18%
Global warming potential (CO2 kg)	13,009	17,262	4,253	33%
Air emission index (index scale)	3,820	4,222	402	11%
Water emission index (index scale)	3	29	26	867%
Solid waste (total kg)	3,496	3,181	-315	-9%
Atlanta house **Type of frame**	**Wood**	**Steel**	**Difference**	**Steel vs. wood (% change)**
Embodied energy (GJ)	168	231	63	38%
Global warming potential (CO2 kg)	8,345	14,982	6,637	80%
Air emission index (index scale)	2,313	3,373	1,060	46%
Water emission index (index scale)	2	2	0	0%
Solid waste (total kg)	2,325	6,152	3,827	164%

More interesting yet were the results in energy use when comparing just the materials that substituted for wood in both house designs. In these cases the differences appeared in the manufacturing phase. In the milling of lumber, a good deal of the energy expended is actually bio-energy, meaning that wood by-products from the milling process – like bark, sawdust and trim that is not used in other engineered wood products – is used either to power turbines to create electricity or to provide heat directly to the drying kilns. As a result, the amount of purchased non-bioenergy decreased for the wood house. (Bio-energy comes directly from organic material such as woody biomass, for example. Non-bioenergy comes from fossil fuels such as petroleum, coal and natural gas.)

According to the CORRIM report, "While the total energy in the completed steel-frame house was only 17 percent greater than the completed wood-frame house, for the products being compared, the steel-frame design used 281 percent more non-bioenergy than the wood-frame design." In the Atlanta house, "the concrete frame used 250 percent more non-bioenergy than the wood frame... Comparing just the substitute materials in the frames underscores the environmental advantages of wood."

LCA was also used by the Athena Institute in Canada to develop an "Eco-Calculator" that measures the specific environmental effects of construction designs or assemblies such as exterior/interior walls, roofs, floors, windows, columns and beams. Additionally, the Yale report summarized findings available in Europe and North America from LCAs of forest and agricultural products (i.e., bio-based), but similar in-depth analysis is not yet available for alternative materials.

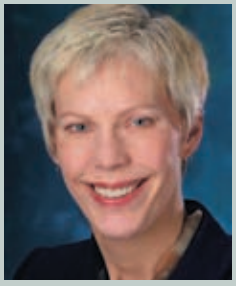
James Wilson
Vice President,
Consortium for Research on Renewable Industrial Materials Professor Emeritus, Wood Science and Engineering
Oregon State University
Corvallis

"We've seen a general substitution for wood in many aspects of home construction for some years, using less of it for siding, windows, roofing and other purposes in the general belief that these other materials are 'greener.' The CORRIM study suggests that when we take a comprehensive look at building materials, including total energy consumption, global warming, air and water emissions and solid waste disposal, wood turns out to perform better in most categories. After some experimentation with new building approaches using concrete or steel in recent decades, it appears that for environmental purposes we may return to one of the oldest, tried-and-true materials of them all - wood."

Oregon Wood And Green Building

Growing evidence of wood's environmental advantages in low-rise commercial building and residential construction is, of course, good news for Oregon and its forest sector, but there are questions that have to be addressed. For one, though wood has many environmental advantages compared to concrete and steel, it is difficult to quantify such ecosystem benefits as habitat diversity or beautiful, abundant open spaces. The question of where locally produced Oregon wood fits in with green building certification programs has yet to be satisfactorily understood and resolved.

However, there does appear to be growing consensus about the economic and environmental benefits of using wood, especially wood that is locally grown and manufactured. And, Oregon is actively looking for ways to reward forest landowners who provide ecosystem benefits beyond what is required by law such as recreational access and additional carbon sequestration. Finally, as concern continues to mount about the role of carbon emissions in global warming, the bio-energy used in producing wood products compares favorably to alternative products requiring intensive use of fossil fuels and their accompanying release of greenhouse emissions. This benefit is magnified when the carbon stored in solid wood products is calculated as part of the equation.



Cassie Phillips
Vice President,
Sustainable Forests and Products
Weyerhaeuser Company
Federal Way, Wash.

"Some of the world's most productive forests are in the U.S. Pacific Northwest, where a balance of climate, soils and species can grow commercially valuable trees on an economically sustainable basis. Many Northwest private forest owners manage intensively, planting trees and using other practices adapted from agriculture, while meeting the world's highest environmental standards. These lands provide valuable ecological services while growing trees at two to three times the rate of less intensively managed forests locally, and many times the rate of forests in slower growing regions. So reducing production on one acre here would have to be compensated for by managing two to 10 acres elsewhere. Even if the other forests are well-managed, the result would be a larger environmental footprint to produce the products we need and use every day."

Wood and Oregon's Culture

David Morman of the Oregon Department of Forestry recently attended a meeting in Finland and was struck by the extent to which wood is part of its culture – from the beautiful wood flooring at the Helsinki Airport to the wood façade around the Olympic venues and the ancient barns in the countryside. "In the U.S., including Oregon, we've lost a sense of how wonderful wood is as a building material," he said. Frances Bronet, dean of the School of Architecture and Allied Arts at the University of Oregon, noted that "wood in construction has a centuries-long tradition and is the foundation of architecture." And Christine Theodoropoulos, head of the Department of Architecture, observed that wood was the central material in the original Northwest architectural style. With regard to residential structures, "now we tend to frame with it, cover it up and forget it's there," she said.

Other building materials have assumed an important place in building design and have aided development of the built environment. For example, one cannot for structural reasons, build a high-rise office building without concrete and steel. But, as the green building movement grows stronger, it is likely that wood will get a fresh look. Architect Brockman noted that for the past few years wood has become the dominant structural material for low-rise commercial construc-

tion utilizing what is called "four-over-one" or "five-over-one" construction techniques, where the first floor is often concrete but the next four or five floors are wood. "The economics are so positive that most buildings of this scale have used this construction technique in recent years," he said.

Addressing Problems the Oregon Way

When Jennifer Allen heard about the conundrum of Oregon wood and its use in green building, she was intrigued. Allen, associate professor and acting director of the Portland State University Center for Sustainable Processes and Practices, saw two strong Oregon economic enterprises – the forest sector and the green building sector – and she was intrigued by the opportunity to bring them together.

Working through the OBC, Allen facilitated informal meetings between Brockman and Donegan, along with Leslie Lehmann of the Oregon Forest Resources Institute (OFRI), Jeremy Rogers of the Oregon Business Council, Ryan Temple of Sustainable Northwest and Peter Hayes, a small FSC-certified forestland owner and member of the Oregon Board of Forestry. The group talked about a range of issues including forest economics, carbon sequestration, preventing the conversion of working forests into subdivisions and other development, the problems of large and small forestland owners, and the state's vibrant, green building movement. They also discussed how to encourage the development of "outcome" or "criteria" based forest sustainability standards at a national level, rather than depending exclusively on one forest certification or green building rating system, and how to ensure that LCA is incorporated.

The OBC, having recognized both the green building and forest sectors as strong components of the state's economy, chose to include "use of Oregon wood in green buildings" as part of its annual Oregon Leadership Summit in 2007 with the intent of furthering the discussion. Added to Allen's original group were more forestry representatives: Lee Jimerson of The Collins Companies, Pete Sikora of Giustina Resources, Scott Leavengood of the OSU Wood Innovation Center, David Morman of the Oregon Department of Forestry, and green building expert Ralph DiNola, of Green Building Services.

A common feeling among the participants was that, although a gap exists between the green building community and the forest sector, both groups share a deep respect for the environment and Oregon's long tradition of forest management. They also agreed that Oregon needs to leverage the two sectors to each others' advantage. Brockman said, "If Oregon can't do it, who can?" And private landowner Donegan echoed, "If the growth of the green building cluster can provide opportunities for Oregon forest products, it would be a great synergy that would benefit both sectors and the state as a whole."

COMMITMENT TO SUSTAINABILITY

"...Oregon is unique in its longstanding commitment to sustainability. Sustainability here has roots as deep as our Native American and pioneer heritage. It is nurtured by the values of Oregonians and defined by public policies as diverse as forest practice requirements, land use planning, solid waste recycling, wetlands protection, green space investment, and support for light rail and bicycle transportation... Both residential and commercial real estate developers are increasingly incorporating sustainability principles in site planning, building design and landscaping."

Policy Playbook:
***Gaining Sustainable Advantage*,**
2007 Leadership Summit,
Oregon Business Plan

Tom Nygren
Family Forest Landowner
Hillsboro

"For the past eight years or so, I've been involved in the Oregon Woodland Co-op, which is a group of about 50 small woodland owners. Because we're all different and all have our own individual objectives, we look to different certification systems to meet our needs. About 30 to 40 are American Tree Farm certified, 10 to 15 Forest Stewardship Council, and several are certified under both systems. We help owners by providing services and helping them diversify their forest income by producing specialty products where a custom home builder is looking for a small quantity of one type or another, and owners can mill it themselves on site. Recently we had a number of FSC-certified owners aggregate their Douglas-fir timber and do a group sale to a mill in the area, realizing a 10 percent premium on the sale in the process."

Promising New Directions

Significant progress has been made by the Oregon Department of Forestry, the Oregon Economic and Community Development Department, OSU, OFRI and private sector partners to create a state economic development strategy for the forest sector that addresses the role of Oregon wood in green building standards, among many other priorities.

Within higher education, the Oregon Wood Innovation Center is providing another valuable means of promoting green building. A relatively new joint venture between the OSU College of Forestry and the OSU Extension Service, the center has become a major resource for wood products manufacturers, with whom it shares the latest innovations in products, processes and business systems. As the green building movement has grown, the center – in addition to its mission of providing a link between cutting edge academic research and the commercial wood products sector – works with the architectural, engineering and building communities to make information available on material selection and the beneficial environmental properties of wood products.

In a related development, in 2007 at the recommendation of the Oregon Innovation Council, the Oregon Legislature established the Oregon Built Environment & Sustainable Technologies Center. Known as "Oregon BEST," this independent, nonprofit organization builds on the state's reputation as a national innovator in sustainability, natural resources and renewable energy. According to president and executive director David Kenney, Oregon BEST connects the state's business community with a shared network of university researchers and laboratories to grow Oregon's green building and renewable energy sectors. "The goal is to position Oregon as a global leader in the emerging green economy," Kenney said.

Recognizing the value in synergy, the Oregon Wood Innovation Center, the UO School of Architecture and Allied Arts, PSU Center for Sustainable Processes and Practices, and OFRI collaborated on a project to address questions that architects and construction engineers may have about making material selection decisions and the information resources – or "gaps" in information resources – available to them. The project, funded in part by Oregon BEST and OFRI, included a survey of Oregon architects; a symposium for architects, architecture students and builders; and a workbook summarizing symposium results.

Meanwhile, the value of green building construction nationally is projected to increase to $60 billion by 2010, according to *McGraw Hill Construction*. Here in the Northwest a new report, *Carbon-Free Prosperity 2025*, prepared by Climate Solutions and Clean Edge, takes a comprehensive look at new clean-tech, green

Oregon BEST - Growing the Green Economy

BEST idea: A research + design assistance initiative that advances approaches to responsible material selection in building design.

This provides a distinctive opportunity for Oregon to remain a global leader in green building products and design applications.

It can bridge the architectural, planning, engineering and science communities within UO, OSU, PSU, OIT and traded sector and professional stakeholders.

This idea relates to the BEST focus area of green building-green infrastructure.

Why now? Addressing the challenges of responsible building material selection is a critical step in advancing sustainability.

What collaborators are needed? Architects, biologists, ecologists, economists, engineers, foresters, landscape architects, material scientists, planners, social scientists.

industries. It said they have the potential to create more than 63,000 new jobs in the Pacific Northwest by 2025. The growth of these clean-tech sectors, the report claimed, would position the region as a leader in the dramatic global shift toward cleaner and more efficient forms of energy, transportation and building systems that reduce pollution and reliance on imported fossil fuels. According to a recent article by Jennifer Allen and State Economist Tom Potiowsky in the November 2008 *Economic Development Quarterly*, "Portland...has a robust and competitive green building cluster that is supported by local and export demand, a critical mass of leading edge firms, strong supporting institutions, qualified employees and a robust supply chain."

"Wood as a regenerative product has tremendous potential, depending on the way it's grown and harvested. In Oregon, we're close to wood. Our history is tied up in it," said architect Horsley. The spirit that inspired innovative Oregon policy from the bottle bill to public beaches to energy tax credits is at work building bridges between the green building and forest sectors. Oregon is uniquely blessed with a vast natural forest resource. How we make it work for our benefit – environmentally, economically and socially – is up to all of us.

Brian Kernohan
Manager, Wildlife & Forest Stewardship
Forest Capital Partners
Portland

"The greatest improvement in sustainability and environmental protection can be gained by bringing the 90 percent of wood harvested around the world that is not regulated by any effective environmental law or certification system under sustainable management. The point is that if the wood does not come from certified forests in North America, then it will come from exploitation of non-regulated sources elsewhere."

Appendix

Resources for Additional Information	Web Sites
American Tree Farm System	treefarmsystem.org
Cascadia Region Green Building Council	cascadiagbc.org
CORRIM Study	corrim.org
Forest Stewardship Council	fsc.org
Green Building Initiative	thegbi.org
Green Globes	thegbi.org/green-globes-tools
LEED™ Rating System	leed.org
National Association of Home Builders	nahb.org
Oregon Best	oregonbest.org
Oregon Business Plan – *2008 Policy Playbook*	oregonbusinessplan.org
Oregon Department of Forestry *2003 Forestry Program for Oregon*	oregon.gov/odf/board/2003FPFO.shtml
Oregon Department of Forestry	oregon.gov/odf
Oregon Wood Innovation Center	wood.oregonstate.edu
Pharos Project	cascadiagbc.org/education/pharos
Sustainable Forestry Initiative	aboutsfi.com/index.html
U.S. Green Building Council	usgbc.org

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Page 6: Metafore Forest Certification Resource Center, online database of certified forests and certified products (metafore.org). ATFS data provided by the American Forest Foundation. See also 2009 *Oregon Forest Facts and Figures,* published by the Oregon Forest Resources Institute, oregonforests.org. Amounts do not add up to the statewide total due to multiple sources and rounding.

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