

Engineered Wood

SPRING 2009

JOURNAL



**FROM MOVEMENT
TO MANDATE**
The Growth of Green
Building Legislation

THE THz SOLUTION
The Prospects for
Terahertz Imaging
Technology

INDUSTRIAL STRENGTH
Non-Construction Market
Applications Help Soften the
Effects of the Housing Slump

THE OFFICIAL PUBLICATION OF APA – THE ENGINEERED WOOD ASSOCIATION



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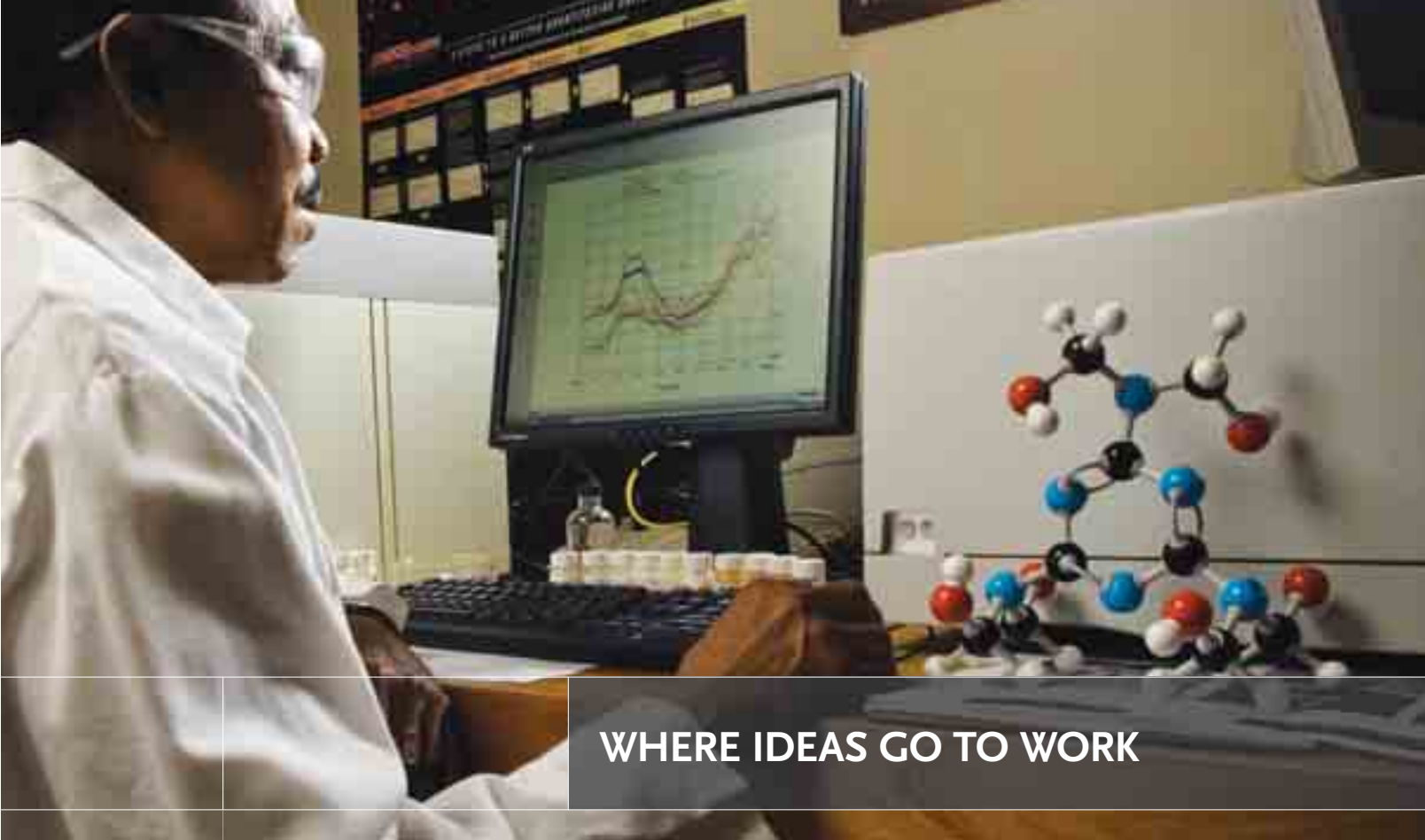
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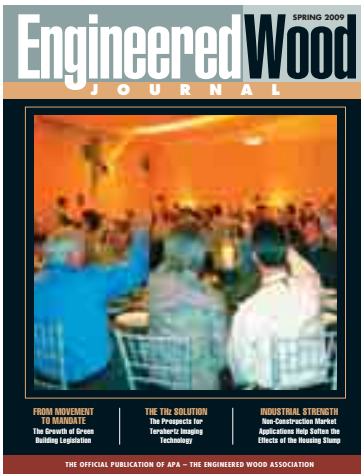
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About the Cover:

Winners of the annual APA Safety Awards Competition are toasted during the Chairman's Dinner at the APA annual meeting held last fall in Henderson, Nevada. Recent changes to the awards competition are detailed on page 10.

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The Perils of Prediction

The seemingly inane observation that “business will be either better or worse,” attributed to Calvin Coolidge, 30th president of the United States, may not be as empty-headed as it sounds.

Take the case—and lesson—of David Lereah, former chief economist for the National Association of Realtors. Lereah, who was featured earlier this year in a *Wall Street Journal* story as a kind of symbol for the perils of prediction, was a highly visible and persistent proponent of the view that the housing market was headed for a “soft landing.” (Some readers may recall his discounting the idea of a national housing bubble at APA’s annual meeting in Tucson, Arizona, in late 2005.)

Lereah, after things began to go south, was widely criticized for so badly missing the mark. The criticism is not entirely fair since few knew then what we know now about the scope of the risks associated with all those securitized subprime mortgages and credit default swaps. And as the *Journal* story rightly pointed out, Lereah was hardly alone in miscalculating what lay ahead.

Indeed, few who might have been expected to speak with authority on the subject raised much alarm about the gathering storm clouds. There were some, of course, but the collective psychology of the bandwagon—aided and abetted by an amalgam of greed, naiveté, ignorance, blind faith, misguided government policy, regulatory dereliction and private and public corruption—was simply too great a force to reverse.

A more striking example, perhaps, of prophecy gone wrong was *Dow 30,000 by 2008: Why It’s Different This Time*, published in 2003 by Robert Zuccaro. No, Mr. Zuccaro isn’t a late-night infomercial pitchman. He’s a financial services firm executive.

It’s not possible quite yet to say they were dead wrong, but James Glassman and Kevin Hassett would seem to be out on a limb with their prediction in a best-selling book, published in 2000, that the Dow Jones Industrial Average would reach 36,000 in three to 10 years. (Those 10 years expire in a few months.) David Elias beat their bravado a year earlier when he published *Dow 40,000* (albeit not until 2016). And if you can wait until 2020 (oh happy days), look for the Dow to reach 100,000, according to Charles Kadlec, whose book also came out in 1999.

Then there’s switch-hitting Harry Dent. He has followed up his prediction of the Dow at 40,000 (*The Next Great Bubble Boom*, 2004) with the just-released *The Great Depression Ahead*. The latest volume predicts that the Dow will languish between 3,800 and 7,200 in 2012. Yikes!

A book titled *The Coming War with Japan* was published in 1991. Hmmm, that just doesn’t sound right today. Francis Fukuyama argued in *The End of History* that Western liberal democracy was about to become the victorious and undisputed ideological model for the entire world. The book came out in 1992, at the joyous end of the Cold War, but nine years before September 11. It does not seem to have made the rounds yet in Iran, Russia, Zimbabwe, or Venezuela.

Marx predicted the dictatorship of the proletariat, Khrushchev said he would bury us, Hitler proclaimed the thousand-year Reich. And weren’t the Tigers supposed to take the American League Central last year?

What to make of all this? President Coolidge, known as Silent Cal because of his reluctance to pontificate, simply observed that “I have never been hurt by anything I didn’t say.” Well said.

Yogi Berra may have summed it up best, though. “It’s tough to make predictions, especially about the future.”

Congratulations, Bill Robison

William T. (Bill) Robison, retired president of APA and more recently retired volunteer secretary/treasurer of the Plywood Pioneers Association, will be honored for his years of service to the industry at the Plywood Pioneers’ annual meeting in Tacoma May 29.

Bill served APA for 41 years, retiring in 1992. He has served the Pioneers Association another 16 years. Those two stints of service, totaling nearly six decades, represent a remarkable and commendable record.

Congratulations, Bill. Well done! •



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2008 Panel Production Declines 20 Percent

U.S. and Canadian structural wood panel production fell 7.8 billion square feet (3/8" basis) to 30.68 billion feet last year, a 20 percent decline from 2007, according to year-end data released by APA.

The protracted housing market slump accounted for most of the decline. U.S. single-family and multifamily housing starts totaled just 904,300 last year, compared with 1.35 million in 2007, a 33 percent decline. It was the worst year for U.S. housing starts since record-keeping began in 1959.

Production of other structural engineered wood products also declined for the year. Glulam and laminated veneer lumber output fell 31 percent while I-joist production declined 32 percent.

APA's annual spring forecast is expected to be completed around May 1.

PS 1 and PS 2 Standing Committees Reconvened

The Standing Committees for *PS 1* and *PS 2*, the voluntary product standards for structural plywood and wood-based structural-use panels, respectively, have been reconvened to review matters of growing importance to the industry. Among them are panel thickness labeling requirements, formaldehyde emissions and green labeling.

The thickness labeling issue arose as a result of a discrepancy between the thickness tolerances found in NIST Handbook 130 and those specified in industry standards, which led last year to the red-tagging of panels at retail yards by the California Division of Measurement and Standards. A dual labeling program now in effect is providing an interim solution to the problem. However, revision of *PS 1* and *PS 2* panel labeling provisions to better accommodate the NIST Handbook requirements is believed to be necessary to provide permanent resolution and to better safeguard producers against claims of mislabeling.

Provisions related to formaldehyde emissions and "green" labeling have been proposed by some as a means to proactively address those issues.

LP's Wagner Appointed Co-Chair of Wood Products Council

APA Vice Chairman Jeff Wagner, executive vice president, OSB at Louisiana-Pacific, was recently appointed co-chairman of the Wood Products Council (WPC), the nonprofit alliance of North American wood products associations that oversees the industrywide WoodWorks nonresidential construction market campaign. Rick Franko, vice president, export lumber sales and market development, at West Fraser Timber Co. Ltd., is the other co-chairman.



The council is governed by a board of directors comprised of senior industry executives representing the organization's five charter members—APA, American Wood Council, Canadian Wood Council, Southern Forest Products Association and Western Wood Products Association. APA President Dennis Hardman is the current WPC president and Canadian Wood Council Vice President Etienne LaLonde is vice president/secretary.

Forest Products EXPO Slated for June in New Orleans

EXPO 2009, the 30th Forest Products Machinery & Equipment Exposition sponsored and produced by the Southern Forest Products Association, will return to New Orleans this year for the first time since 1991.

Held every two years, the event showcases the latest products and services for the wood products industry.



This year's EXPO is scheduled for June 11-13 at the New Orleans Morial Convention Center. More information can be found at www.sfpexpo.com.

New Performance-Rated Siding Standard Completed

A new *Standard for Performance-Rated Engineered Wood Siding (ANSI/APA PRP-210)* developed under APA's recognition as an American National Standards Institute (ANSI) accredited standards developer was recently completed and published.

The new standard is based on and replaces APA's proprietary standard *PRP-108*. It was developed by an 18-member Standards Committee comprised of representatives of manufacturers, suppliers, regulatory agencies, government, academia and inspection agencies. APA served as secretariat.

APA is also utilizing its ANSI accreditation to spearhead development of a national consensus standard for structural insulated panels in cooperation with the Structural Insulated Panel Association (SIPA). More information can be found on APA's Standards Development page at www.apawood.org/standards.

ANSI Approves National Green Building Standard

The American National Standards Institute (ANSI) earlier this year approved the National Green Building Standard™ (ICC 700-2008), the first green building standard ever approved by ANSI.

Developed by the International Code Council (ICC) and the National Association of Home Builders (NAHB) and then vetted through a consensus process that included builders, architects, product manufacturers, regulators and environmental experts, the new standard covers all residential construction work, including single-family homes, multifamily buildings, condominiums, land development, and remodeling and renovation.

The standard provides an alternative to the U.S. Green Building Council's LEED® program, which is widely viewed as biased against wood construction. The consensus committee deliberated the content of the standard for more than a year, held four public hearings and evaluated more than 2,000 public comments. ●

Potlatch, Calvert Execs Elected to APA Board

Tom Temple, vice president of wood products at Potlatch Corporation, and Doug Calvert, president of Calvert Company, Inc., were elected recently to the APA Board of Trustees.



Tom Temple

Temple served on the APA Board from 2003 to 2007, most recently as vice chairman, while at Canfor Corporation. Calvert has served for 16 years on the APA Glulam Management

Committee, including a term as chairman. He also served four years as chair of the APA International Market Subcommittee.

The elections, which fill recent vacancies, return the governing body to 16 members.

quarterly data reporting, reduction in the number of competition categories, and creation of safety innovation and safest member company awards. The annual competition henceforth also will be restricted to APA members, although safety data will continue to be sought from the entire industry.

In keeping with the goal of broadening recognition of the competition winners, the latest honorees also were recognized during the Chairman's Dinner at the Association's 2008 annual meeting. The winners were:

- Boise Cascade's Willamina, Oregon, veneer mill;
- Georgia-Pacific Wood Products' Corrigan, Texas; Fordyce, Ark.; Gloster, Miss.; and Madison, Ga., plywood plants;
- LP's Athens, Ga., OSB facility and Wilmington, N.C., I-joint and LVL plant; and
- Timber Products Company's Yreka, California veneer plant.

Annual Meeting Set for Nov. 14-16 on Amelia Island, Florida

APA's 71st annual meeting, set for Nov. 14-16 at the Ritz-Carlton, Amelia Island, Florida, will return to a Saturday through Monday schedule, which is a more popular format according to APA attendee surveys. The meeting last year began on Sunday and ran through Tuesday.

Located approximately 30 minutes from Jacksonville International Airport, Amelia Island is the southernmost of the Sea Islands, a chain of barrier islands along the eastern U.S. seaboard. The hotel features 444 guestrooms, each with a private balcony; four restaurants; 1.5 miles of dune-lined beachfront; and an 18-hole PGA championship golf course just outside the front door.

The venue was booked prior to the economic downturn and could not be changed without incurring substantial penalty. More information about the resort and meeting will be sent soon to all APA and Engineered Wood Technology Association members.

APA Mill Safety Awards Program Redesigned

Several changes were made recently to APA's annual Mill Safety Awards Program designed to elevate its prestige within the industry and to broaden recognition of the annual winners.

The changes were recommended by a new APA Mill Safety Competition Awards Program Standing Committee and approved by the Board of Trustees. The committee is chaired by APA Vice Chairman Jeff Wagner, LP, and comprised of leading APA member company safety professionals, including Pat Wright, Roseburg Forest Products Co.; Mark Dicarlo, RoyOMartin; Bill Sellen, Georgia-Pacific Wood Products LLC; Blu Santee, Plum Creek; Keith Harned, LP; and Christine Alford, Hood Industries, Inc.

Changes include implementation of a severity-weighted Time Incidence Rate (TIR), annual versus



John Murphy Appointed Chair of EWTA Committee

APA Trustee John Murphy was recently appointed chairman of the Engineered



Wood Technology Association (EWTA) Advisory Committee, succeeding Dr. Fu-Shou Lin, who has retired from Georgia-Pacific Wood Products.

Murphy has been an APA trustee since 1998 and was chairman of the Board of Trustees from Sept. 2003 to Nov. 2005.

Lin, who served on the committee for more than a decade and as chairman since 2004, was praised by EWTA Managing Director Terry Kerwood for his "dedicated service and valuable insights over many years."

EWTA (www.engineeredwood.org) is a related supplier organization of APA. Its Advisory Committee reports to the APA Board of Trustees.

APA Publishes First in Series of System Reports

The first in a planned series of APA System Reports designed to facilitate the use of engineered wood systems was published recently. The reports cover systems that may not be referenced in building codes but that can be used as alternatives to code provisions

The new report, *Design for Combined Shear and Uplift from Wind*, Form SR-101, is based in part on combined shear and uplift testing conducted at the APA Research Center in Tacoma. The System Report series follows the successful introduction in 2006 of APA Product Reports, which provide APA members a means to introduce products to the marketplace without the initial cost or expensive delays of the normal

International Code Council code report process.

Nearly 40 APA Product Reports have been issued to date on behalf of a dozen APA members. The new System Report can be downloaded as a PDF from the Publications section of the APA website.

Boise's Medford Plywood Mill Joins APA

Boise Cascade's Medford, Oregon plywood mill joined APA, effective March 1. The mill becomes the company's third APA member facility. The other two are its plywood plants in Oakdale and Florien, La.

"We are delighted to welcome another Boise Cascade mill to the APA membership ranks and look forward to providing the Medford facility the very best in quality assurance, technical assistance and market support services," said APA President Dennis Hardman.

Mary Jo Nyblad, Boise Cascade's sales and marketing manager, is a member of the APA Board of Trustees and chairperson of the Association's Marketing Advisory Committee.

Bill Robison to Be Honored by Plywood Pioneers

Retired APA President Bill Robison, who also recently stepped down from his volunteer position of secretary/treasurer of the Plywood Pioneers Association (PPA), will be honored for his years of service to the industry at the organization's annual meeting to be held May 29 in Tacoma.

Robison, who was with APA for 41 years and retired in 1992, has been active with the Pioneers Association since then. Yvonne Nemes, an administrative assistant in APA's Technical



Services Division, was appointed by the PPA Board of Directors to succeed him as secretary/treasurer. She has provided administrative support to PPA for the past six years.

The Pioneers Association is a fraternal organization of retired and active members of the plywood manufacturing and supplier industries. Founded in 1964, it publishes historical monographs, supports university scholarship programs, and undertakes other educational and fraternal activities.

More information about the organization can be found at www.apawood.org/plywoodpioneers/. •

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From Movement To Mandate

The Growth of Green Building Legislation

by Mark Rossolo

While green building may once have been a fringe movement embraced by a select few architects and building owners, it is fast becoming common practice—and is now being driven not only by design and building professionals looking to make their projects more sustainable, but by a staggering increase in government legislation.

Whether it's a city councilman, state representative or United States Senator, politicians are under pressure to facilitate the adoption of green building practices. In political speak, proposing a green building policy is viewed as “win-win” for legislators, who see it as a way to (among other things) address climate change, reduce our dependence on foreign oil and ensure that our children have a better place to live—all while saving the government money through energy and water efficiency.

It also allows elected officials to position themselves in the eyes of the public as environmentally conscious and willing to act on important issues for the benefit of their community and country.

For these and other reasons, there has been an explosion of legislative activity, particularly at the state and municipal levels. In 2007, for example, 32 states debated more than 170 bills related to some aspect of green building, an already incredible number that grew to 33 states and more than 200 bills in 2008. The municipal numbers are just as impressive, as nearly every major population center across the country, large or small, has looked at ways to increase green building practices through public policy.

For its part, the federal government has recently debated a number of bills regarding energy efficiency in schools and other buildings, and agencies—such as (but not limited to) the Department

LEED® vs. GREEN GLOBES®

Although there are many green building rating systems in the United States, the two national systems most commonly used for commercial structures are LEED and Green Globes. (Leadership in Energy and Environmental Design U.S. Green Building Council (USGBC), www.usgbc.org; and Green Globes Environmental Assessment and Rating System Green Building Initiative (GBI), www.thegbi.org).

Growing interest in buildings that are better for the environment, healthier for occupants and more cost-efficient to operate is helping to drive the popularity of green building rating systems such as LEED and Green Globes.

Governments, in particular, see it as their role to lead by example, and legislation requiring the use of these systems is becoming increasingly common. At the same time, building science experts continue to find new and better ways to build “green” and the systems themselves are evolving.

Fundamental Similarities, Significant Differences

Comparing LEED and Green Globes, one finds many similarities. Part of the reason for this is they both evolved from the same source—the Building Research Establishment’s Environmental Assessment Method (BREEAM). Ideas as to what constitutes green building also tend to be widely accepted, so it stands to reason that both systems emphasize things like energy, water and resource efficiency, site ecology, indoor air quality, and pollution. Both are points-based systems that can be used to achieve a certified rating of performance and include four roughly equal rating levels.

The systems also have significant differences. Targeted to the top 25 percent of the market, LEED involves a more complex and time-consuming process, but is well-entrenched and enjoys strong brand recognition. Designed for widespread appeal, Green Globes is web-based and easy to use—even for those with limited environmental design experience—and is gaining ground thanks in part to growing mainstream interest.

As the “Scoring Points with Wood” chart indicates, the two also differ in the way they treat wood. The most significant issue is the fact that LEED only recognizes timber certified by the Forest Stewardship Council (FSC), while Green Globes is more inclusive, recognizing timber certified through FSC as well as the American Tree Farm System (ATFS), Canadian Standards Association (CSA) and Sustainable Forestry Initiative (SFI). Aside from the fact that independent research has shown that all of these systems are effective, there is also the issue of supply. There are more than 390 million acres of certified forest in North America, but less than 1/6 of that amount is certified by FSC.

Acres Certified in North America (in millions of acres)*

Canadian Standards Association	179.3
Sustainable Forestry Initiative	131.6
Forest Stewardship Council	56.8
American Tree Farm System	24.4

*Source: Canadian Sustainable Forestry Certification Coalition, www.certificationcanada.org



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SCORING POINTS WITH WOOD

While both are points-based systems, LEED includes a possible total of 69 points, while Green Globes includes up to 1,000. (The total for Green Globes varies because projects only

receive scores in applicable categories.) Materials and resources represent approximately 19 percent of LEED and 10 percent of Green Globes points.

ISSUE	LEED® for New Construction	GREEN GLOBES® for New Construction	COMMENT
Life Cycle Assessment (LCA)	Not currently included; the USGBC is considering how to incorporate LCA into future LEED products	10 points each for using LCA tools to choose building systems or assemblies; GBI is working to integrate LCA data into the system	LCA is a way of evaluating materials over their entire lives based on measurable environmental impacts; it eliminates subjectivity from the judgment process
Renewability	1 point if 5% of the total value of buildings materials comes from rapidly renewable sources, defined as 10-year rotation or less	5 points for proportion of materials that are bio-based, such as green insulation, natural fibers and natural structural materials	10-year rotation is arbitrary; preference should be given to all renewable materials with an emphasis on those shown to be superior through LCA.
Forest Certification	1 point if 50% or more of the wood-based materials and products are FSC certified	5 points for lumber and timber panel products that originate from sustainable sources and are certified through SFI, CSA, FSC or ATFS	Points should be given to wood that comes from a sustainable source and is certified through any credible program
Locally Produced Materials	1 point if a minimum 10% of total building materials were extracted, processed and manufactured within a 500 mile radius; a second point for 20% minimum	Potential advantages of locally manufactured materials are captured in preference for materials that have undergone LCA	Locally produced materials do not necessarily have less impact on the environment
Other Possible Points	1 point for low-emitting materials if composite wood and agrifiber products contain no added ureaformaldehyde resins	5 points for environmentally preferable products and equipment that are third-party certified	
		0.5 points for raised floors	
		0.5 points for partition walls that are easily removed and recyclable	

Wood and Life Cycle Assessment (LCA)

LCA studies show that wood has a softer environmental footprint than steel or concrete in terms of embodied energy, air and water pollution, and greenhouse gas emissions. It also has better insulating value, which reduces the need for heating

and cooling. For more information, please visit the Athena Sustainable Materials Institute at www.athenasmi.ca or the Consortium for Research on Renewable Industrial Materials at www.corrim.org.

of Interior, Environmental Protection Agency, General Services Administration and Department of Health and Human Services—have either adopted or proposed formal green building policies for all of their buildings.

To date, the vast majority of legislation has focused on the new construction of publicly funded buildings. This isn't a surprise when you consider that most public entities are under severe pressure to reduce their budgets; the potential

operational savings associated with high performance buildings are simply too attractive to ignore. The most common type of legislation currently mandates publicly funded buildings over a given size threshold—typically between 5,000 and

10,000 square feet—to meet or exceed guidelines set forth by a green building rating tool. The Green Building Initiative's (GBI) Green Globes® standard and the U.S. Green Building Council's (USGBC) LEED® tool are the most common rating systems named, though there are many other programs in existence.

At the same time, an increasing amount of green building legislation is also being targeted toward the private sector, where governments are choosing either to incentivize or mandate energy efficiency and other aspects of building performance. Incentives, which have been the more popular choice so far, vary widely—from low-cost measures such as expedited permit processes and fee rebates for those who meet certain requirements, to more costly measures such as property tax refunds. However, some governments, such as the City of Washington, D.C., have also chosen to mandate green building within their jurisdictions, and recent history has shown an increasing willingness among legislators to legally require certain practices.

Green Building Legislation and the Wood Industry

For the wood industry and other manufacturing sectors, the most significant potential impacts of green building legislation are not related to energy efficiency or other similar mandates, but the requirement to use certain green building rating systems and the specifics of what those systems entail.

It is the position of the GBI, for example, that legislation should never mandate one rating system exclusively. In addition to the fact that multiple credible systems exist in this country—and, given that, the inappropriateness of a government body creating a monopoly—it is unreasonable to expect that one system can meet the needs of every design and building professional, type of building and budget. As in many other segments of the economy, competition among rating systems also drives the improvement of each and lowers costs, something we've already witnessed as Green Globes has gained increasing market acceptance alongside LEED.

From a wood industry perspective, the issue is how different rating systems treat the various competitive building

materials. For example, both Green Globes and LEED award points for wood that is certified as having come from a sustainably managed forest, but Green Globes recognizes a number of credible systems—such as the Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), American Tree Farm System (ATFS) and Canadian Standards Association (CSA)—while LEED recognizes only FSC. As your industry often points out, independent research has shown all of these systems to be effective. But, aside from that, an FSC-only approach creates

an issue of supply, since the vast majority of forests in the United States are certified to other systems.

Green Globes is also the only rating tool that currently incorporates life cycle assessment, or LCA, which is a method of scientifically analyzing building materials and assemblies over the course of their entire lives and assigning an unbiased score that reflects their true environmental impacts. As part of the recently completed process to establish Green Globes as the first American National Standard for commercial green

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building, GBI commissioned a tool that provides instant LCA results for hundreds of common building assemblies. That tool has been incorporated into the Green Globes standard and is also available free of charge, under the name ATHENA® EcoCalculator for Assemblies, from the Athena Institute (www.athenasmi.ca).

By allowing designers to impartially evaluate and compare design scenarios based on their environmental impacts, LCA helps to ensure that a building meets its sustainability objectives—without influence from pre-existing biases that have long been an accepted part of green building. An example of this that's relevant to the wood

industry would be rewarding a product with recycled content without considering the embodied energy actually required to extract, manufacture, transport, install and maintain that product over time.

Making Sure Your Voice is Heard

While the GBI is vocal in its support of a competitive environment and tools that make green building more accessible to mainstream practitioners, it is the responsibility of individual industries to voice their own concerns about the potential for a rating system monopoly.

The legislative and regulatory environment surrounding green building

is evolving quickly—and the current economic challenges will only serve to increase the desire for operational and other savings associated with building sustainability. Elected officials nationwide are in the process of deciding what is considered green, whether to put in place incentives or mandates, which rating systems will be used to determine success, and other issues that will impact everyone involved in the building industry for many years to come.

Organizations such as the American Forest and Paper Association (AF&PA) are active in the legislative arena on the wood industry's behalf, but the only way to ensure that all levels of government understand the importance of issues such as competition and LCA is for the industry to participate en masse in the debate. Joining a green building organization such as the GBI, participating on a committee working to expand green building within your state or municipality, or submitting your comments with regard to proposed policies and legislation all allow you to engage in the discussion and ensure your voice is heard.

Participation also allows you to showcase your industry's strengths and relevance to the green building movement, and the efforts you have made over many years to ensure that your products and processes are sustainable. ●

Mark Rossolo is the director in charge of state outreach for the Green Building Initiative, www.thegbi.org.



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The THz Solution

The Prospects for Terahertz Imaging Technology in the Wood Products Industry

by Dennis Callaghan and Matt Reid

Many parts of the electromagnetic spectrum have been tapped to provide sensing and imaging capabilities for applications in the forest industry. Microwave kiln drying, infrared moisture sensors, visible light profilers and X-ray density scanning machines are examples that span the electromagnetic spectrum.

Terahertz (THz) radiation, which falls between microwave and infrared frequencies, is noticeably absent from this list. This is not because THz radiation is not useful to the wood products industry, but rather because the technology to produce and detect THz radiation for industrial sensing has not been available.

Every new development in THz technology brings us closer to realizing its potential for imaging and sensing in the industry. It is not every day that a part of the electromagnetic spectrum becomes available for use in new applications.

What Is THz Radiation?

Long wavelength radio-waves to very short wavelength X-rays span the electromagnetic spectrum. The terahertz part of the spectrum lies between microwave and infrared, having shorter wavelengths than microwaves but longer wavelengths than infrared waves. To date, this part of the spectrum has remained relatively unexploited for industrial applications. However, new developments in technology are opening the door to new and exciting applications that are taking advantage of the unique characteristics of radiation in the THz part of the spectrum.

The characteristics that are driving significant interest in this emerging technology include transparency, resolution and safety. THz waves can penetrate most non-metallic dry materials in a similar fashion to X-rays. Having much longer wavelengths than X-rays, the radiation is non-ionizing and therefore much safer than X-ray technologies. This has generated significant interest in security applications where clothing can be penetrated on a human body without health risk.

There is also increasing interest in pharmaceutical and biomedical applications because packaging materials can be transparent at THz frequencies, and the radiation can detect unique spectral signatures of pharmaceutical and biological compounds.

Why is there interest in this technology for the wood products industry? Consider the characteristics that one would like to have for imaging wood products. It is desirable to be able to look “through” the wood for imperfections and defects, so *transparency* is an important characteristic. It is also important to be able to see the features that are of interest. That is, the *resolution* of the imaging technique is important to resolve the

features of interest. It is convenient to have no regulatory restrictions in implementing the technology, and therefore *safety* also is a plus factor.

In addition to the properties listed above, the strength properties of wood products are strongly tied to the internal fibre structure of the materials. The ability to *probe gross fibre structure* makes THz very attractive to wood product manufacturers. These four characteristics—transparency, resolution, safety and probing ability—are summarized with the different portions of the electromagnetic spectrum that can access them in the nearby table. As noted, Terahertz waves are the only part of the spectrum that can access all four characteristics, and that is why we expect this technology to play a significant role in the wood products industry moving forward.

Moving the Technology into the Wood Products Industry

Researchers at the University of Northern British Columbia working with local industry have been looking at applications of terahertz technology to the forest

	Transparency	Resolution	Safety Probes	Fibre
X-ray	Yes	Yes	No	No
Visible	No	Yes	Yes	Yes
Infrared	No	Yes	Yes	Yes
Terahertz	Yes	Yes	Yes	Yes
Microwave	Yes	No	Yes	Yes

products industry. This research has attracted a lot of attention and has recently received funding from both Western Economic Diversification and the Northern Development Initiative Trust. The current Terahertz project is a partnership between:

- Deltech Manufacturing Inc.
- The University of Northern British Columbia
- The College of New Caledonia
- A&D Integrations
- Western Economic Diversification Canada
- The Northern Development Initiatives Trust
- Natural Sciences and Engineering Council of Canada

The first phase of the initiative was to identify potential value of the technology in the wood products industry. Several viable applications were found in engineered wood products, dimensional lumber and in the pulp and paper industries. The second phase of the project was a technical feasibility study, which determined that the unique characteristics of terahertz technology would be best suited to a first application study in the oriented strand board industry.

Terahertz Technology in the OSB Manufacturing Process

The production of OSB involves converting a log into dried wafers, or “flakes.” Flakes are aligned on a forming line to generate a mat, which is pressed at high temperature with adhesives and pressure to form the boards themselves. Each OSB panel consists of four separate layers: a top and bottom in which the flakes are aligned and face forwards, and two core layers where the flakes are aligned and face sideways. The structural strength properties are derived from the overall density of the board (the amount of flakes used) and the orientation of the flakes in the two directions.

Because raw materials, including the wood used, form a large percentage of total production costs in the OSB process, it is desirable to minimize the amount of raw materials used. The reduction of materials is limited by the need for the finished OSB panels to meet performance standards, which provide a baseline of performance in regulated markets. These standards are met in part by statistical sampling of the product (after production), usually in off-line quality

control tests involving the manual testing of board strength.

It is both the overall density and fibre orientation of the strands imparted by the formers that lead to the strength of the finished product. It is therefore desirable to OSB manufacturers to have the capability to measure and control these two parameters on the mat before the press. Technologies have been developed to measure density, including X-ray and mechanical measurement techniques, but these measurement tools do not have the capability to measure the fibre orientation (or direction of the strands).

Attempts have been made to measure fibre orientation using visible profiling and other techniques that are restricted to examining the surface of the mat. Since the mat has a large thickness, this lack of transparency has to a large degree limited these types of fibre orientation measurement techniques.

The transparency of the mat at THz frequencies allows an average measurement of density as the radiation is transmitted through an OSB board. The characteristics of the THz radiation transmitted through the board can be used to produce an image of the density profile



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of the boards. For example, the difference between a struc-1 grade and regular grade board shows up as an increased amount of red (higher transmission of the THz radiation through the lower density regular grade board).

The ability to measure density alone is only part of the key to minimizing materials costs in the OSB process. Sensing of the fibre orientation is also required. This is what we believe is the most powerful measurement capability that THz technology has to offer. It is possible to examine the average fibre orientation through the board *at the same time* as measuring the density of the boards. An image similar to that used for density can be produced, but showing the deviation from the theoretical target values for the orientation of the wood flake.

Next Steps

A proof-of-concept device is being developed through the collaboration of the partners mentioned above. An alpha prototype is expected to be operational in the summer of 2009 to demonstrate that density and fibre orientation can be measured on the mat before the press. The current stage in research is to characterize the measurements on an OSB mat, as opposed to the boards themselves, in a manner that is easily integrated by the controls system at an OSB plant.

The key to the success of this project will be that the target variables can actually be measured in real-time so that cost-savings for the OSB plant can be realized. There is also strong potential in other engineered wood product manufacturing processes that display similar issues to those outlined in the OSB process currently under investigation, such as in log profiling and moisture content measurement.

THz imaging is an emerging technology, and it is expected that more work will need to be done to mature the technology to a point where a robust, commercial system can be produced for sale. However, once a viable and working prototype is in use significant changes to wood products scanning and imaging may be on the way.

Conclusion

New and powerful Terahertz technology is expected to play an important role in sensing and imaging within the forest products industry as a result of its inherent safety, the

transparency of wood at these frequencies, the resolution that is possible with the technology, and its sensitivity to internal fibre structure.

While there are many applications in the industry that could ultimately benefit from these capabilities, the OSB industry applications are the first target of research efforts presently under way. Proof-of-concept equipment is under development to tackle the problem of measuring fibre orientation and density on the OSB mat before the press, which is expected to

produce significant cost savings to the average OSB plant. •

Dennis Callaghan is strategic planner at Deltech Manufacturing Inc. (www.deltech.ca). He can be reached at dennisc@bidconst.com or 250-570-2405. Matt Reid is an assistant professor of physics at the University of Northern British Columbia. He can be reached at mreid@unbc.ca or 250-960-6622.

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Industrial Strength

by Jack Merry

Non-Construction Market Applications Help Soften the Effects of the Housing Slump

It's certainly no panacea. In fact, it too has declined in tandem with the overall economy. But the industrial market for structural wood panels has provided relative steadiness and at least a partial buffer to the demand shock of the housing market collapse.

The industrial market encompasses a wide and diverse range of applications, from upholstered furniture and kitchen cabinets to crates, pallets, boats and signage. APA, which periodically researches industrial market panel usage and use trends, surveyed 33 market segments in its last study, for the year 2005.

According to APA's latest estimate, the U.S./Canadian industrial market consumed approximately 6.15 billion square feet of structural wood panels in 2008. That was almost 11 percent below the 2007 mark and 16 percent below the volume recorded for 2005, when the industry produced a record-setting 43.1 billion square feet of panels.

Compared with the housing market, however, those numbers aren't too bad. Demand for structural panels in residential construction fell 32 percent in 2008 from the previous year, and a staggering 53 percent from 2005. Industrial market demand also shows strength in terms of its percentage of total industry production—hovering between 17 percent in 2005 and about 20 percent last year. Panel consumption in the residential construction market, by contrast, has fallen from 61 percent of production in 2005 to just 40 percent last year.

The importance of the industrial market “becomes most manifest in times like these, when housing demand tanks,” notes APA Field Services Manager

Mark Halverson, who also serves as staff advisor to the APA Industrial Market Subcommittee. “It’s a critical pillar of support for overall market demand.”

The subcommittee, comprised of some 16 APA member company representatives, is chaired by Kevin Daugherty, plywood and veneer sales manager at Swanson Group Mfg. LLC, Glendale, Ore. One of four subcommittees of the APA Marketing Advisory Committee, the group advises staff on development of industrial market promotion activities. Under the 2009 Strategic Marketing Plan, those activities support three primary objectives: information transfer tailored to the needs of industrial users and specifiers, promotion of the environmental advantages of structural wood panels, and positioning the reliability and safety of APA member products relative to competitive products, including imported panels.

The centerpiece of the Association's industrial market promotion is performancepanels.com, an APA website devoted exclusively to structural wood panels for industrial market applications. Launched in 2006, the site covers panel product attributes and features specially suited for a wide variety of industrial applications, including furniture, cabinets, displays, pallets, crates and boxes, agricultural bins, racks, reels, mezzanine floors, trucks and railcars, recreational vehicles, boats, signs and specialty applications. Links to APA manufacturers based on various panel characteristics and features also are provided.

The site logged nearly 68,000 unique visits last year, up 25 percent from the previous



year, and generated approximately 28,000 “click-throughs” to APA member sites by prospective customers seeking information on industrial grade products. Some 30 APA member companies are linked on the site.

Among structural wood panels, plywood continues to dominate the industrial market, commanding an estimated 72 percent of share last year compared with oriented strand board’s 28 percent. A key reason for the spread is the ability of plywood manufacturers to more readily provide special lay-ups and customized features tailored to specific market niches and application requirements. OSB use in industrial applications has grown considerably, however, rising from a mere six percent in 1998 as a result of a leveling off of OSB market share growth in construction sheathing markets and implementation of new technologies and product features that better suit OSB to industrial uses.

The key competitors to domestic structural wood panel manufacturers are steel, aluminum, plastic, domestic hardwood plywood, and imported panels of all varieties.

In 2005, the last year for which reliable data are available, imported softwood plywood commanded a 19 percent share of the major industrial markets; imported OSB about nine percent. Domestic and imported hardwood plywood used in industrial applications totaled 7.3 billion square feet that same year, of which about 19 percent was imported.

Structural wood panel imports have been declining since then, however, in response to the lower value of the U.S. dollar, higher transportation costs and the excess of domestic production capacity as a result of the housing market collapse. Softwood plywood and OSB imports are estimated to have totaled just 867 million square feet last year, down from 2.7 billion feet in 2005. Hardwood plywood imports also have declined.

The environmental merits of domestically produced structural wood panels should aid in growing market share in the future as user and specifier material selections are based increasingly on “green” attributes. That appears particularly significant with regard to formaldehyde emissions, an issue spurred in part by increased media coverage of the new California Air Resources Board (CARB) formaldehyde emissions rules that went into effect January 1 and by a flurry of news reports last spring on formaldehyde concentrations in travel trailers and mobile homes that were provided as temporary housing to Gulf Coast hurricane victims by the Federal Emergency Management Agency (FEMA).

Based on information supplied over several months to CARB by APA, member products fall outside the scope of the CARB

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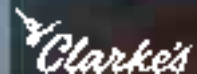
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rules by virtue of their low emissions. Member products also meet or are exempt from the world's other leading formaldehyde emission standards and regulations—facts that are highlighted in an APA document developed last year. However, because the issue is often subject to media distortion and public confusion and has now also come under Environmental Protection Agency (EPA) review, the APA staff and member advisory committees continue to work on additional possible courses of action.

One such course might be including formaldehyde emissions provisions in industry consensus standards, an approach under consideration by the *PS 1* and *PS 2* industry standards standing committees. APA, in addition, has conducted tests and issued market alerts regarding the high formaldehyde emissions levels of some imported panel products, particularly from China.

APA also is developing a list of forest certification programs used by member companies as an additional means of

documenting the environmental merits of APA member products.

What of the future? With continued marketplace education about the products' numerous advantages—consistent quality, specialized performance attributes, reliable supply, low formaldehyde emissions, green properties and cost-effectiveness compared with competing materials—the potential for market share growth appears promising.

The main challenge at present is the economy. APA's latest forecast is for industrial market demand for structural wood panels to decline again this year as the economy struggles to regain momentum. Next year and succeeding years, however, are expected to show renewed growth, maintaining the industrial market as an important end-use for structural wood panels. •

Jack Merry (jack.merry@apawood.org) is industry communications director at APA.

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- 1-3 Council of Forest Industries Annual Convention, Prince George, BC, 250-564-5136, www.cofi.org.
- 17-19 American Institute of Architects Gulf Coast Green 09 and Consumer Expo, Houston, Texas, www.houstongreenexpo.com.
- 19-21 American Institute of Timber Construction Annual Meeting, San Diego, Calif., 303-792-9559, www.aitc-glulam.org.
- 27-29 NAHB's Building for Boomers and Beyond: 50+ Housing Symposium, Philadelphia, Penn., 800-368-5242 ext. 8133, www.nahb.org.
- 4/30-5/2 American Institute of Architects Expo2009, San Francisco, Calif., www.aiaconvention.com.
-

MAY

- 8-10 NAHB's National Green Building Conference, Dallas, Tex., 202-266-8489, www.nahb.org.
- 11-12 Forest Products Society Conference on Wood & Biofiber Plastic Composites, Madison, Wis., 608-231-1361, ext. 20, www.forestprod.org.
- 13 Forest Products Society Cellulose Nanocomposites Symposium, Madison, Wis., 608-231-1361 ext. 20, www.forestprod.org.
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JUNE

- 9-10 Southern Forest Products Association Mid-Year Meeting, New Orleans, La., 504-443-4464 ext. 231, www.sfpa.org.
- 11-13 Southern Forest Products Association Expo 2009, New Orleans, La., 504-443-4464 ext. 214, www.sfpaexpo.com.
- 16-19 Construction Specifications Institute Construct 2009 and Annual Convention, Indianapolis, Ind., www.constructshow.com.
- 21-23 Forest Products Society International Convention, Boise, Idaho, 608-231-1361 ext. 20, www.forestprod.org.
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SEPTEMBER

9/30-10/2 Alberta Forest Products Association Annual General Meeting & Conference, Jasper, Alberta, 780-452 2841, www.albertaforestproducts.ca/news_events.

NOVEMBER

- 4-5 North American Building Material Distribution Association Annual Convention, Nashville, Tenn., 888-747-7862, www.nbmda.org.
- 5-7 North American Wholesale Lumber Association Traders Market, Chicago, Ill., 847-870-7470, www.nawla.org.
- 13-16 APA Annual Meeting and Info Fair, Amelia Island, Fla., 253-620-7429, www.apawood.org.
- 19-20 U.S. Green Building Council Green Building Conference, Boston, Mass., www.greenbuildexpo.com.

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Fred Fields, longtime former owner of Coe Manufacturing Company, displays the Bronson J. Lewis Award presented to him by APA Chairman Mike Rehwinkel during the APA annual meeting last fall in Henderson, Nevada.



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