The Science of Sustainability

HOW COMPOSITE WOOD PANELS MEASURE UP

An intensive life cycle study shows that familiar residential, commercial and retail substrates are "better than climate neutral"

In an interview a few years ago, New York Times columnist Tom Friedman was asked: "How will we know when the "green movement" has come into its own, that it has succeeded?

"When we no longer hear, or see, the word 'green'," was Friedman's reply. He further noted:

- There won't be such a thing as a "green car." There will just be a car, and you won't be able to build it except at the highest levels of efficiency.
- There won't be such a thing as a "green home." There will just be a home, and you will not be able to build it unless it is at the highest standards of energy, efficiency and sustainability.

Friedman may be right but we're not there yet, though consumers and designers are increasingly green-minded. Their concern is not only for the quality of the environment and the responsible use of natural resources, but also for their own health and quality of life.

There's an interesting trend emerging. The more informed consumers are, the more curious they become. Consumers are scrutinizing the clothes they wear, the cars they drive, and the cleaning products they use as carefully as the fruits and vegetables they eat.

They want to know about the ingredients that make up their world, and are setting out to do so with the passion of new parents making choices for their first child.

WHAT ARE COMPOSITE WOOD PANELS?

Products like medium density fiberboard (MDF), particleboard, hardboard and engineered wood siding and trim are widely known but still not well understood. Collectively known as composite wood panels, these products embody many of the properties associated with sustainability and environmental friendliness.

For starters, by volume they are approximately 90% wood, 10% binders and resins. Most or all of that wood is recovered from other operations – recycled pre-consumer wood residues such as shavings, sawdust, plywood trim and chips, and post-consumer urban wood waste. Composite panels can also be produced from agri-fiber sources.

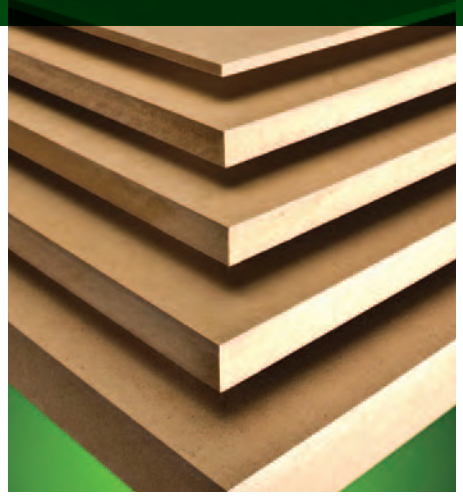
Composite wood panels are produced by:

- Mixing wood particles or fibers with resin, paraffin wax and other additives;
- Forming the panel;
- Consolidating and curing it under pressure and heat; and
- Sanding and sawing it to desired dimensions.

Composite wood panels can be engineered for specific performance characteristics such as resistance to moisture or fire, indoor air quality standards, screw-holding strength, density, different thicknesses, and other physical and mechanical properties. Compared to solid wood, composite wood is more stable and dimensionally consistent. That is because wood in its natural state has a tendency to warp when exposed to heat or humidity changes. The cells in its lignin are oriented in the same direction, thereby multiplying the effect as they swell or contract. On the other hand, fibers in composite panels are distributed evenly in all orientations, effectively negating this multiplier effect.

MDF

In MDF, or medium density fiberboard, wood is refined down to cellulosic fibers to create a smooth, homogenous panel that can be machined with intricate detail and into complex shapes. It is found in furniture and fixtures, cabinetry, architectural millwork and mouldings, laminated panels, laminate flooring, and finely detailed furniture and architectural components.



The stability, strength and homogeneity of MDF allows for a broad range of applications. Interior MDF mouldings are easily machined and laminated or painted. It is widely used in the manufacture of kitchen cabinets. Interior designers find new and exciting ways to use MDF such as decorative surface paneling. MDF is used as the core material in store fixtures and laminate flooring. It can be machined with very tight tolerances and is used frequently in interior doors, office furniture, and paneling.

The American National Standard for Medium Density Fiberboard (ANSI A208.2) is the North American industry voluntary standard. It classifies MDF by physical and mechanical properties and identifies product grades. Specifications identified in the Standard include physical and mechanical properties, dimensional tolerances and formaldehyde emission limits. The Standard was developed through the sponsorship of the Composite Panel Association (CPA), in conjunction with producers, users and general interest groups.

PARTICLEBOARD

Particleboard, as the name implies, is composed of small wood chips or particles. It has been a staple building material for many decades, and has benefited from continuous refinement and improvements. It is an economical, stable, and resource-efficient substrate for furniture and fixtures, cabinetry, shelving, floor and stair underlayment, countertops and door cores.

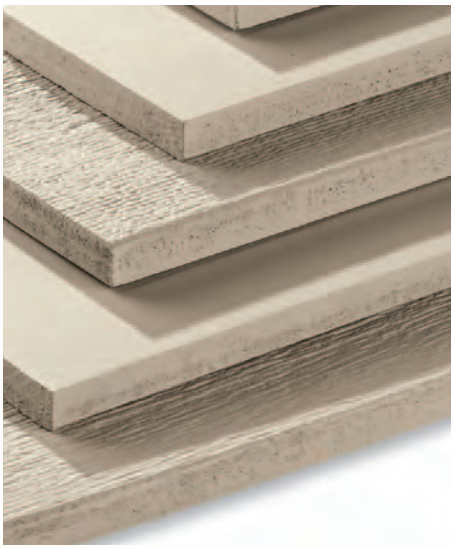
Particleboard has excellent machining characteristics, which is important when post-forming high pressure laminate countertops and for prefabricated edge applications. The stability and consistency of the material lends itself for use as work surfaces, and the core for interior doors.

The American National Standard for Particleboard (ANSI A208.1) is the North American industry voluntary, consensus-based standard. It classifies particleboard by density and strength and covers physical, mechanical and dimensional characteristics as well as formaldehyde emission limits.

HARDBOARD

Hardboard is manufactured primarily from inter-felted ligno-cellulosic fibers consolidated under heat and pressure. It is commonly used in prefinished paneling, exterior trim and siding, office and residential furniture, door skins and pegboard. The ANSI Hardboard Standard classifies hardboard by thickness and physical properties, and includes five classes: Tempered, Standard, Service-Tempered, Service and Industrialite. The American National Standard for Prefinished Hardboard Paneling (ANSI A135.5) establishes the property requirements for dimensional tolerances and moisture content, along with resistance to abrasion, fading, heat, humidity, scrape, steam and stain.

Hardboard has a uniform thickness, density and appearance and has no grain. It resists marring, scuffing and abrasion, as well as changes in temperature and humidity. Hardboard can be cut, routed, shaped and drilled with standard woodworking tools. In addition, hardboard can be securely glued or fastened with screws, staples or nails. Hardboard panels can be laminated with paper overlays, plastic laminates and veneers.



ENGINEERED WOOD SIDING AND TRIM

Engineered wood siding and trim has enhanced properties for exterior use, including resistance to moisture, dimensional stability and protection against fungal decay and termites.

The engineered properties translate into long-lasting durability allowing for decades of service life while maintaining an attractive appearance. Today's engineered wood siding and trim products are highly versatile and come in many forms including sophisticated woodgrains and embossed surfaces.

The ANSI National Standard for Engineered Wood Siding (ANSI A135.6) covers requirements and methods of testing for exterior durability, dimensions, straightness, squareness, physical properties and surface characteristics. It also includes trade terms and methods of identifying engineered wood siding. Third-party certification to the ANSI Standards is required for many applications of siding panels. Many building code jurisdictions require the physical properties of engineered wood siding to be third-party certified. An ANSI Engineered Wood Trim Standard is under development and will be completed in 2012. The new standard will cover requirements and methods of testing for exterior durability as well as physical and mechanical properties.

DECORATIVE SURFACES ADD VALUE, INCREASE PERFORMANCE

Most composite panels destined for furniture, fixtures and interiors are laminated with a decorative surface or overlay. Laminating composite panel surfaces and edges not only adds design value and performance, it also encapsulates the panel, minimizing the off-gassing of any volatile organic compound (VOC) that may remain from the manufacturing process.

With industry-wide design matching programs, different types of laminates with varying degrees of durability and application flexibility share the same design structures and colors, allowing designers to easily "value engineer" their projects for cost and performance – choosing the exact level of performance needed for each surface while enhancing the design harmony of the overall project.

Architects and designers cite value and durability as the primary benefits of specifying these materials as they address the ever-present challenge of maintaining cost stability and design consistency from project to project.

Surface materials that complement composite panels include thermally fused melamine (TFM), 3D laminates, film overlays, decorative foils and papers, high pressure laminates (HPL) and liquid and powder coatings.

COMPOSITE PANELS' POSITIVE LIFE CYCLE

When looking at the environmental impact of products that will be used in residential, commercial, retail and healthcare settings, it is critically important to take a comprehensive view of life cycle – all the inputs and outputs required in manufacturing. This scrutiny is key to verifying claims that a product is truly "earth-friendly" or "green."

A scientific paper written in 2010 by James B. Wilson, Professor Emeritus of the College of Forestry, Wood Science and Engineering at Oregon State University, presents a comprehensive life cycle inventory (LCI) and life cycle inventory analysis (LCIA) of the manufacture and use of wood-based composite panels.

A life cycle inventory is an accounting of all inputs and outputs to manufacture the product. The analysis begins with the generation of the forest, through harvesting, examining delivery, product manufacture, use and disposal – whether its landfilled, used for fuel, or recycled. All inputs are measured, including electricity, fuels, chemicals and materials use, from their in-ground resource through extraction, delivery and manufacture. Outputs measured include product, co-product, and emissions to air, water and soil.

Wilson conducted both "cradle-to-gate" and "gate-to-gate" analyses. "Gate-to-gate" studies product manufacture through the processing plant. "Cradle-to-gate" documents the environmental impact of manufacturing a product from its in-ground resources through all aspects of production and transportation to produce a finished product.

Wilson's studies met the rigor of both the Consortium for Research on Renewable Industrial Materials (CORRIM 2001) and the International Organization for Standardization (ISO 2006) guidelines in terms of their protocol, format, review, transparency, and reporting for public availability. Wilson's work is also based on the methodology of the U.S. EPA's Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), which provides a consistent set of metrics on various products and material categories and assists in impact assessment for sustainability metrics, life cycle assessment, industrial ecology, process design, and pollution prevention.

WOOD IS A RENEWABLE RESOURCE

One of the most important reasons for the positive environmental impact of building with composite wood panels is the recognition that wood is one of the planet's most efficiently renewed resources.

Composite wood panels are produced mostly from wood residuals from existing forestry practices containing recycled wood from pre or post-consumer waste. The wood fiber may also be certified by such third party groups as FSC (Forestry Stewardship Council) SFI (Sustainable Forestry Initiative), ATSF (American Tree Farm System) and CSA (Canadian Standards Association).

EFFICIENT MANUFACTURING

A look at the total manufacturing equation (inputs vs. outputs) is key to determining a products' impact on the environment. The composite panel manufacturing process is highly efficient, with little solid waste left unused or going to a landfill. In fact, less than 3% of the wood fiber raw material ends up as waste.

Another environmental benefit in the manufacturing process is that these wood residues are gathered from relatively close facilities, on average within 160 km (100 miles) of the facility/mill/plant which conserves transportation fuel use.

THE CARBON SINK EFFECT

Wilson's analysis shows that composite panels (both particleboard and MDF) are actually better than climate neutral materials that help mitigate climate change.

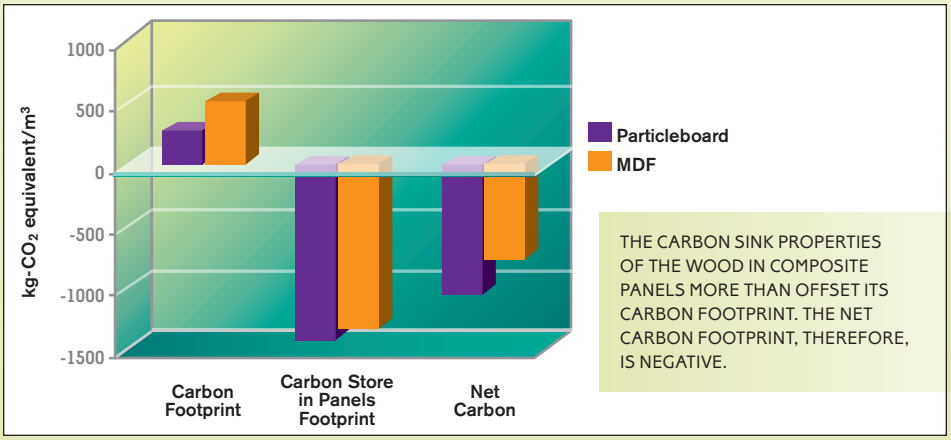
Carbon develops in trees through photosynthesis, making up 50% of wood's chemical structure, which is stored – prevented from re-entering the atmosphere as CO2 – until the wood is broken down. This stored carbon offsets composite panels' total carbon footprint, which is the sum of greenhouse gas (GHG) emissions from resources in the ground through to product manufacture, such as CO2, methane, nitrous oxide and the fluorinated gases that contribute to climate change.

Every 1.0 kg of carbon store is equivalent to 3.67 kg of CO2 that does not occur in the atmosphere until released. With sufficient remaining carbon offset to negate additional carbon emissions due to product delivery, use, and disposal at the end of their carbon cycle, composite panels also offset additional carbon of CO2 in the atmosphere.

The carbon sink properties of the wood in composite panels more than offset its carbon footprint. The net carbon footprint, therefore, is negative. Since GHG emissions are known to contribute to climate change, the negative values of the net carbon footprint means that these materials are actually better than climate-neutral.

ENERGY USE

The amount and type of energy use plays a large role in the environmental impact of producing a product. Composite wood panels benefit from the fact that a significant portion of required heat comes from the combustion of woody biomass fuel, the natural residuals from the manufacturing process. Biomass fuel is climate neutral because CO2 emitted from its combustion is reabsorbed by growing trees, forming more wood. Using waste wood to generate energy displaces fossil fuels, such as natural gas and oil, which do contribute to climate change. Woody biomass is nature's sustainable, renewable fuel resource.



THE CARBON SINK PROPERTIES OF THE WOOD IN COMPOSITE PANELS MORE THAN OFFSET ITS CARBON FOOTPRINT. THE NET CARBON FOOTPRINT, THEREFORE, IS NEGATIVE.

AIR AND WATER QUALITY

Air quality for wood composite panels is addressed in two manners: emissions from the production process, and emissions from the panels themselves. The White Paper's LCI provides data for production for both cradle-to-gate and gate-to-gate emissions.

Composite wood panels' gate-to-gate emissions meet all USEPA Clean Air Act standards.

Wood fuel is recognized by many environmental groups to be carbon neutral, and as such it does not contribute to global warming; panel products have their own carbon store as a major component of wood that is used as an offset against GHG emissions.

The carbon store taken as an offset is a negative value and is larger than the total quantity of GHG emissions from cradle-to-gate that contribute to the GWP. The resulting GWP values are negative and can be used to offset additional GHG emissions for the product's life cycle and CO2 in the atmosphere. This is a significant characteristic of composite wood panels in they help to mitigate global warming.

CRADLE-TO-GATE ANALYSIS

All materials, processes and actions have some type of environmental impact for their production, use and disposal. When selecting a material or product the best approach is to choose one with the least environmental impact that still meets the product's use requirements.

LCI and LCIA data can be used to compare alternative material selections. Ideally the comparison should be based on the intrinsic use of the material in the intended product like office furniture or construction. Because there are so many different material applications, a general comparison can be made on a volume (m3) or weight (kg) basis of the materials as long as the limitation of the approach is recognized. Specifiers can use this data to compare alternate products for specific applications.

By comparison:

- Composite panels are more environmentally friendly than alternate materials in almost every category when compared to alternative materials of steel, cement, plastic and glass.
  - They consume significantly less fossil fuel, feedstock, water and other materials.
  - They beneficially use more renewable wood fuel which displace fossil-fuel use and is considered global-warming- or climate-change neutral.

Environmental Comparison of Particleboard and MDF to Alternative Materials

Cradle–to–Gate	Unit	Particleboard Unit/m³	MDF Unit/m³	Steel Unit/m³	Cement Unit/m³	Plastic Unit/m³	Glass Unit/m³
IN-GROUND RESOURCES							
Fossil fuels & Feedstock	MJ	8,153	12,052	229,357	16,245	80,634	30,679
Wood Fuel	MJ	2,410	8,204	12	0	13	431
Materials	kg	4	22	13,824	5,070	39	3,202
Water	kg	906	2,205	NA[1]	2,621	23,655	22,521
EMISSIONS							
AIR							
Carbon Footprint	kg-CO2 eq	392	621	18,055	4,273	2,413	660
Carbon Sequestered	kg-CO2 eq	1,360	1,343	52	0	1,391	0
Net Carbon	kg-CO2 eq	-968	-722	18,003	4,273	2,413	660
Acidification (TRACI)	H+moles eq	370	547	3,310	1,145	1,013	1,143
Eutrophication (TRACI)	kg N eq	0.16	0.24	-72	0.49	0.34	1.06
Smog (TRACI)	kg NOx eq	2.6	4.5	26	12	37	10
WATER							
BOD & COD	kg	0.09	0.27	15.7	0.09	1.09	5.29
LANDFILL							
Waste	kg	41	68	2,954	NA	NA	NA

[1]NA is not available in database

- Composite panels have negative GWP values:
  - Sufficient remaining carbon store to offset additional CO2 emissions from product use and disposal.
  - Offsets some CO2 in the atmosphere.

CRADLE-TO-GATE ENVIRONMENTAL IMPACT

- Plastic has a carbon component but it is not considered an offset against GHG emissions since its carbon cycle is not near term like wood; plastic is not made from a renewable resource when based on fossil-fuel feedstock.
- Composite panels result in less acidification and smog contribution than any of the alternative materials.
- For emissions of biological oxygen demand (BOD) and chemical oxygen demands (COD), composite panels have the lowest emissions to water except for cement. They all measure the amount of oxygen that would be required to consume organic material in the water, BOD is the lowest (usually) as it measures demand from microbes eating easily digested organics (sugars, etc.), COD measures the demand from all other organics (alcohols, etc.) measured by digesting the material in strong chemical oxidants.
- Overall, particleboard and MDF have the least environmental impact for the resource use and emission factors determined and should be considered green materials that are friendlier to the environment.

RENEWABLE CONTENT – COMPOSITE PANELS TOP THE LIST

The materials listed in the table above can be further described in terms of their renewable component, recycled content, as well as product characteristics such as how they are disposed of at the end of their service life.

Although most of the materials can include a recycled component, the values given are those that were available for the specific materials in LCI databases used for the comparison.

- Of all the materials only the wood panels can be considered as made from renewable and sustainable material.
- All but cement can be made from recycled material.
- Only the wood panels and plastic can be used for fuel to further displace the use of fossil fuels.

COMPOSITE PANELS AND LEED CREDITS

With all the environmental advantages composite panels offer, it's no surprise they may help designers and architects attain LEED accreditation for their projects accruing points for recycled content, regional materials, low emitting material and certified wood. In addition, composite panels may help achieve NAHB credits in the categories of pre-consumer recycled content, resource efficient materials, and low formaldehyde / VOC emissions. For a complete list of credits, visit DecorativeSurfaces.org.

COMPOSITE PANELS AND BIFMA E3-2008 SUSTAINABILITY STANDARD

In addition to helping achieve LEED and NAHB credits, composite panels also meet the following categories in the BIFMA (Business and Institutional Furniture Manufacture's Association) standards:

5.2 Climate Neutral Materials:
5.4 Efficient Use of Materials
5.5 Rapidly Renewable Materials
5.6 Bio-based Renewable Materials – Sustainable Wood
5.8 Recyclable and Biodegradable Materials

EMISSION REGULATIONS FOR COMPOSITE PANELS: CALIFORNIA AND US EPA

Nearly 100% of North America composite panel manufacturers are compliant with the California Air Resources Board (CARB) formaldehyde emission regulations established in 2008. Subsequently, The Formaldehyde Standards for Composite Wood Products Act, signed into law in 2010, established the first comprehensive US national standard for formaldehyde emissions from composite wood products. The law requires emission limitations that are modeled on a regulation adopted by California, the so-called "CARB rule," and mandates that the US Environmental Protection Agency establishes manufacturer quality assurance requirements and third party testing and certification of panel products, giving consumers the highest confidence in the composite wood products they purchase, regardless of where in the world they are manufactured.

COMPREHENSIVE INDUSTRY STANDARD VERIFIES ENVIRONMENTAL CLAIMS

In late 2011, a new environmental standard and certification program was developed to create a verification of adherence to the world's most stringent emission regulations and environmental claims for composite wood products. The Eco-Certified Composite (ECC) Sustainability Standard and Certification Program is a voluntary industry standard developed by the Composite Panel Association (CPA) for composite wood panels and finished products made with particleboard, MDF, hardboard, and engineered wood siding and trim. The new program is the more rigorous successor to the Environmentally Preferable Program (EPP) established in 2002. The basis of the ECC standard includes the "CPA Carbon Calculator," a third-party tool developed to assess the life cycle and carbon footprint of composite wood panels made at a particular manufacturing plant.

ECC Certification is granted on an individual manufacturing plant basis, and requires an on-site qualification audit and subsequent annual audits. Composite panel products must first comply with the stringent California Air Resources Board (CARB) formaldehyde emissions regulation. In addition, the panel manufacturing facility must meet at least 3 of the following environmental requirements:

Carbon Footprint – The plant must demonstrate that the panel's carbon store offsets its carbon footprint cradle-to-gate as determined in kg-CO2 equivalents of greenhouse gas (GHG) emissions. Each plant must use the "CPA Carbon Calculator" to determine if panels perform as a carbon sink resulting in overall net carbon storage.

Local and Renewable Resource – At least 85% of wood fiber must be sourced within 250 miles of the panel plant.

Recycled/Recovered – At least 75% recycled or recovered wood fiber; or at least 50% recycled/recovered wood fiber PLUS a minimum of 5% post-consumer wood fiber.

Sustainability – At least 97% wood fiber furnish is converted to panels or re-utilized as a valued product. Non-valued products include wood residuals shipped to a landfill, material hauled away for a tipping fee as waste material, and boiler ash waste.

Wood Sourcing – Conformity with FSC Controlled Wood Standard (2008), FSC Chain of Custody Standard (2008) or SFI Fiber Sourcing Requirements (2011).

In addition to certification of unfinished composite panels, the ECC Program also provides certification for laminated panels and finished products made with ECC-Certified panels. Certification for laminators, fabricators or component manufacturers builds on ECC certification for panel products and provides an audited chain of custody so ECC-certified products can be followed right to the consumer.

Finished products certified in accordance with the ECC sustainability standard must demonstrate that they contain at least 50% ECC certified composite panels, by volume or weight of the total volume of the finished product or component; and a minimum of 95% of those composite panels, by volume.

ECC Certification is assurance that composite panel products are among the greenest on earth.

SUMMARY

It's rare that a material that's already in common use and that offers great value for performance is found to also be one of the most environmentally friendly materials in its category. But, as the Wilson white paper clearly demonstrates, composite panels:

- Are very material resource efficient
  - 97% of all input wood residues go to product and fuel
  - 3% or less goes to landfill
- Are "better than climate neutral" based on GHG emissions
  - Carbon sink properties
  - Offset CO2 emissions due to delivery, use, disposal, and even some atmospheric CO2
- Make significant use of woody biomass for fuel
- Outperform other materials in terms of in-ground resource, fossil fuel, feedstock and water use, and GWP
- In most cases perform better in terms of acidification, eutrophication and smog environmental impact indices
- With decorative surfaces, composite wood panels offer a durable, cost-effective alternative to rare and fragile materials.

SOURCES:

Newsweek Online, April 3, 2009
Jim Wilson White Paper
CPA Resources

RESOURCES

The Composite Panel Association (CPA) is the trade association for the North American composite panel and decorative surfacing industries. CPA develops and maintains an online library of educational and technical information on the use and specification of industry products. As an internationally recognized and accredited standards developer, CPA publishes the industry's definitive ANSI product standards. CPA also operates the International Testing and Certification Center (ITCC) and manages the Grademark Certification Program, the largest and most stringent testing and certification program of its kind for North American composite panel products. For more information, visit the Composite Panel Association at www.CompositePanel.org.

The Science of Sustainability HOW COMPOSITE WOOD PANELS MEASURE UP

Circle the letter of the correct answer for each question below.

1. Composite wood panels are: (choose one)
- a. Mostly resins.
- b. More than half wood veneer.
- c. 90% wood fiber.
- d. Half wood fiber, half binders.

2. The wood fiber used in composite panels comes from: (choose all that apply)
- a. Agri-fiber sources
- b. Shavings and sawdust from other woodworking operations
- c. Specially planted fast-growth forests
- d. Post-consumer urban wood waste

3. What is the main difference in the makeup of particleboard and MDF?
- a. Particleboard is made from small wood chips; in MDF, the wood is further refined down to cellulosic fibers.
- b. Particleboard uses less virgin fiber than MDF.
- c. Both are made from wood chips, but MDF is formed under higher pressure and heat
- d. MDF surfaces are sanded to a finer finish than particleboard.

4. Which of the following is true about engineered wood siding?
- a. It is engineered to have enhanced properties for exterior use: resistance to moisture, dimensional stability and protection against fungal decay and termites.
- b. It is made from wood species that are inherently resistant to fungal decay and termites.
- c. It is prefinished for preferred exterior-use properties.
- d. All of the above.

5. Laminating composite panel surfaces and edges offers what benefits:
- a. Adds design value.
- b. Decreases durability and performance.
- c. Encapsulates the panel, minimizing off-gassing of VOCs.
- d. Improves the dimensional stability of the panel.

6. According to the article, what is one of the "most important reasons" for the positive environmental impact of building with composite wood panels?
- a. Wood is one of the planet's most efficiently renewed resources.
- b. Composite panels are very efficient to manufacture.
- c. New formaldehyde-free resin and binder systems.
- d. Several factors are ranked equally important in assessing the positives of composite panels.

7. Resource use in composite panel manufacturing, including both wood going into panels and used as fuel in the manufacturing process is:
- a. 82% b. 93% c. 97% d. 85%

8. How are composite wood panels "better than climate neutral?"
- a. Furniture made with composite panels requires cutting down fewer trees than furniture made with solid wood.
- b. Only 0.3% of wood fiber input is not used in the manufacture of the panel.
- c. Wood naturally stores carbon from the atmosphere as it grows, acting as a "carbon sink," more than offsetting its carbon footprint.
- d. Laminated panels are less likely to offgas VOCs.

9. Composite panels are more environmentally friendly than alternate materials in almost every category when compared to which of these alternative materials: (choose all that apply)
- a. Steel b. Cement c. Plastic d. Glass

10. For emissions of biological oxygen demand (BOD) and chemical oxygen demands (COD), composite panels have the lowest emissions to water except for:
- a. Steel b. Cement c. Plastic d. Glass

11. According to *New York Times* columnist Tom Friedman, how will we know when the "green movement" has come into its own, that it has succeeded?
- a. There won't be such a thing as a "green car," there will just be a car, and you won't be able to build it except at the highest levels of efficiency.
- b. There won't be such a thing as a "green home," there will just be a home, and you will not be able to build it unless it is at the highest standards of green energy, efficiency and sustainability.
- c. You'll know the green revolution has been won when the word "green" disappears.
- d. All of the above.

12. What is the new sustainability standard offered by the panel industry? (choose two)
- a. ECC – Eco Certified Composite
- b. ECC – Environmentally Compatible Composite
- c. EPP – Environmentally Preferred Product
- d. EPP – Eco Preferred Panel

13. Composite panels offer great value for performance and are also:
- a. 97% resource efficient.
- b. A durable alternative to fragile and rare materials.
- c. Better than climate neutral.
- d. One of the most environmentally friendly materials in its category.
- e. All of the above.

Take this quiz online at www.DecorativeSurfaces.org

You will earn one (1) Learning Unit by answering at least 80% of the questions on this page correctly and submitting the responses with your contact information. A certificate of completion will be sent to you upon receipt of a satisfactory submission. There is no fee.

MAIL, FAX OR EMAIL COMPLETED QUIZ TO:

Allyson O'Sullivan / Composite Panel Association
19465 Deerfield Avenue, Suite 306
Leesburg, VA 20176
703-724-1128, extension 251
Fax: 703-724-1588
email: aosullivan@cpamail.org

CONTACT INFORMATION:

NAME

COMPANY NAME

ADDRESS

CITY/STATE/ZIP

EMAIL PHONE

AIA #

❑ I would like to receive future CEU courses.