

Western Red Cedar

THE RENEWABLE, SUSTAINABLE CHOICE

Presented By:



LEARNING OBJECTIVES

1. Examine how consumers and businesses are increasingly making choices based on the environmental impact of goods and materials.
2. Describe the environmental benefits of Western Red Cedar.
3. Review how Western Red Cedar is harvested and Environmental Product Declarations that trace the life cycle of Western Red Cedar siding, decking, and timber products.
4. Explore case studies where Western Red cedar was used in various commercial applications, including three sustainable design projects.

CONTINUING EDUCATION

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Sokol Blosser Winery Pavilion by Allied Works Architecture. Photo by Jeremy Bittermann.

A SHIFT IN CONSUMER MINDSET

Eco-friendly behavior is changing how we live and the choices we make about our purchases. Consumers are savvier about the environmental repercussions of their buying habits and are demanding to know where their goods come from and how they are manufactured. Nielsen, a global measurement and data analytics company, in their 2018 study *Sustainable Shoppers Buy the Change They Wish to See in the World*, confirms this: “A new era of sustainability is rising, and it’s touching every corner of the world. Consumers in markets big and small are increasingly motivated to be more environmentally

conscious and are exercising their power and voice through the products they buy.”

Companies, organizations, and entire industries must be conscious of the impact their supply chains, manufacturing processes, and working conditions are having on all aspects of society, including economic, environmental, and social. There is a term for this self-regulating business model—Corporate Social Responsibility (CSR). According to Investopedia, “To engage in CSR means that, in the ordinary course of business, a company is operating in ways that enhance society and the environment, instead of contributing negatively to them.”

While not a mandatory standard, the International Standards Organization (ISO) does provide guidance for businesses and organizations committed to operating in a socially responsible way, via ISO 26000, a voluntary standard.¹ The ISO notes, “In the wake of increasing globalization, we have become increasingly conscious not only of what we buy, but also how the goods and services we buy have been produced.”

RESPONSIBLE FORESTRY MANAGEMENT—CSR IN ACTION

One example of an industry that has taken great strides over the past generation to

transform their industry is lumber. They have improved their environmental performance, the sustainability of forest management and milling operations, and the use of forest fiber. In fact, there are very few products today that come from 100% renewable sources like wood products. Forest management companies are continually balancing environmental and economic values, which include biodiversity, cultural heritage, fish/riparian health, forage and associated plant communities, resource features, soils, timber, visual quality, water quality, and wildlife.

Much of the world's Western Red Cedar is sourced from British Columbia, Canada. The provincial government owns 95 percent of the timberland in British Columbia.² That acreage is managed under Tree Farm Licenses (TFL) that are held by timber management companies. The timber companies manage those lands for free, but in exchange they get the rights to the sustainable yield harvest from those lands. Hence, many timber manufacturing companies also operate lumber mills. They must manage the land according to the Ministry of Forests, Lands, and Natural Resource Operations and Rural Development.³ And, they receive 3rd party certification from either the Sustainable Forestry Initiative (SFI), Forest Stewardship

Timber manufacturing companies begin the annual cut process with a timber supply analysis. They consider the forest composition, the rates of growth, the values that need to be managed, and the constraints that need to be applied to the forest to manage those values.

- In British Columbia over 60% of the 90 million hectares of land base is covered by forest.
- This is 62 million hectares of forest land, of which 52 million hectares are 3rd party certified as sustainably and responsibly managed.
- Less than one half of one percent of forest land is harvested annually.⁴

Council (FSC), or Canadian Standards Association (CSA) to prove they have protected forest values and that the forests are sustainably and responsibly managed.

ARCHITECTS MUST SPECIFY RESPONSIBLY SOURCED WOOD⁶

Social responsibility does not stop at the building product manufacturer. Architects must also understand how their designs impact raw material use, land development, and the health, safety, and welfare of their clients and building occupants. Every building material they specify for a project has an

impact on the environment, so designers bear the responsibility and wield the power to source products from manufacturers with sustainable and ethical business practices.

Architects and other building industry professionals must know where the wood they specify comes from to ensure it's sourced from responsibly managed forests. Grace Jeffirs is an artist and designer who has been studying, writing, and speaking about material use in art and architecture for over a decade. In her white paper *Design for Global Forestry—A New Paradigm for Creative Material Specification* she challenges today's designers to consider how their choices impact this planet and the future. Jeffirs tells architects and designers that they must ask three questions every time they specify wood:

- What is this wood's conservation status?
- From where did this wood originate?
- What is the state of the forest from which the wood was harvested?

Prior to specifying any wood, designers must understand and document where the wood comes from. In a national survey of architects and designers conducted by Wilsonart, it was found that 99% of respondents couldn't identify the majority of endangered and threatened wood and only 24% were very familiar with the Lacey Act, which makes

COMMERCIAL BUILDINGS

SOKOL BLOSSER WINERY PAVILION⁵, DAYTON, OREGON

Cradled in Oregon's wine country, Sokol Blosser Winery Pavilion is a social hub for the entire 100-acre estate. Stretching west to east between the original 1970's winery buildings and a stand of native Oregon White Oaks, the pavilion offers sweeping views of the landscape, and a range of spaces for gathering, entertaining and wine tasting. The heart of the building is a beautiful cedar-clad pavilion, which is flanked by a library, an eat-in test kitchen, an in-ground cellar, and VIP room. Generous overhangs as well as a secret garden—complete with stunning cedar decks and walkways—provide opportunities for enjoying wine, food, and company in all seasons. As with the exterior surfaces, the interior is almost entirely clad in a warm and textured knotty grade of Western Red Cedar, as if the entire structure were carved from a single mass. "The materiality and detailing of the wood were central to the project

vision," explains Nathan Hamilton, Associate Principal at Allied Works Architecture.

"Subtle pushes and pulls from square or rectangular forms give the building a more organic feel, just as the unity of materials blur the boundaries between interior and exterior. Altogether, the building simply feels more 'of' the landscape than any standard form of construction." As for finishing, the AWA team opted for contrasting colors to emphasize public spaces. The outward facing façade was stained with a dark, semi-solid stain, while the interiors and recessed areas of the exterior were finished with a transparent stain intended to preserve, as closely as possible, the natural appearance of the cedar, while maintaining that color over time. According to Hamilton: "Now in its seventh year, the cedar has maintained its fresh appearance and is weathering beautifully."



The heart of the building is a beautiful cedar-clad pavilion, which is flanked by a library, an eat-in test kitchen, and an in-ground cellar and VIP room. Sokol Blosser Winery Pavilion by Allied Works Architecture. Photo by Jeremy Bittermann.

LIBRARIES AND OTHER PUBLIC BUILDINGS

using responsibly harvested wood not only an ethical choice, but a legal responsibility. That being said, 70% prioritize using responsibly sourced wood and 67% are willing to pay more for legally sourced wood.⁷

One way building product manufacturers can be open about their supply chains and manufacturing processes is through transparency documents such as Environmental Product Declarations (EPD's), which we will discuss later in the article. EPDs are an easy way for architects to ensure they are specifying environmentally responsible materials. One such material is Western Red Cedar.

THE LONG HISTORY OF WESTERN RED CEDAR

In recent years, composites have been overtaking wood as a building material for siding, decking, and landscape elements. But, as consumers become more educated about the environmental role of building materials and the negative consequences of composites, they are realizing the benefits of wood. Price and appearance are still primary factors when choosing a material, but environmental impact is on the rise as a consideration.

Western Red Cedar, scientific name *Thuja plicata*, is the only *Thuja* species native to Western North America.⁹ It is a natural wood

CALGARY CENTRAL LIBRARY®, CALGARY, ALBERTA, CANADA

Proving you can never have too much of a good thing, the Calgary Central Library uses approximately 21,000 SF of Western Red Cedar on its soffit, which is also one of the largest freeform double-curved surfaces in the world. For the Snøhetta architecture team—who co-designed the technologically advanced public space with DIALOG—using nature's most versatile building material on community projects is somewhat of a specialty. The Norwegian trans-disciplinary firm also built the Charles Library at Temple University in Philadelphia, using over 25,500 SF of Western Red Cedar on the main dome, which is a 42' tall double-curved ellipsoid. As for DIALOG, using beautiful warm wood to create bold civic buildings is nothing new either. Together, these award-winning firms really out did themselves when it comes to incorporating natural materials with contemporary design for maximum impact.

Inspired by the nearby foothills, the site is transformed into a terraced topography that rises up and over the existing Light Rail Transit Line crossing the site. The lifted library, with an open entry at the heart of the site, allows for a visual and pedestrian connection between East Village and Calgary's downtown. For the stunning cedar soffit, Vancouver-based engineering firm, StructureCraft was brought on board to design and build the



Each cedar panel curves down toward the ground, creating an entrance intended to attract the public into the building. Calgary Central Library by Snøhetta & DIALOG. Soffit by StructureCraft. Photo by Lucus Epp & Julian Parkinson.

freeform wood structure. The cladding is formed into a series of arches and curves inspired by the Chinook winds, with Western Red Cedar battens creating a series of bifurcating patterns across the surface. To achieve this doubly curved underbelly, the battens were initially straight but then bent and twisted as they were applied onto panels, following minimum energy curves known as geodesics across the surface. Thanks to the rich warmth and natural beauty of cedar, this magnificent modern mass creates an inviting opening and acts as the welcoming point for all visitors.

GLOSSARY

Corporate Social Responsibility (CSR)—A self-regulating business model that helps a company be aware of the impact they are having on all aspects of society, including economic, social, and environmental, and be accountable to itself, its stakeholders, and the public

Environmental Product Declaration (EPD)—A transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle

Flame Spread Ratings—Describe the surface burning characteristics of interior finishes and are used to regulate the use of interior finish materials to reduce the probability of rapid fire spread

Forest Stewardship Council (FSC)—An international system covering forest management practices and

the tracking and labeling of certified products and paper products with recycled content

Life Cycle Assessment (LCA)—Also known as a cradle-to-grave or cradle-to-cradle analysis, an LCA is a rigorous study of inputs and outputs over the entire life of a product or process and the associated environmental impact of those flows to and from nature

Life Cycle Improvement Analysis (LCIA)—Identification of areas where environmental impacts can be reduced or mitigated within the life cycle of the product or processes

Product Category Rule (PCR)—Defines the product category, describes the scope of the life cycle assessment (LCA) to be conducted, and identifies the types of potential impacts that must

be evaluated and reported in an Environmental Product Declaration

Sustainable Forestry Initiative® Program—A sustainable forest management standard targeting large industrial operations in Canada and the United States

Tree Farm Licenses (TFL)—Licenses held by timber management companies that ensure they manage the land according to Canada's Ministry of Forests, Lands, and Natural Resource Operations and Rural Development; TFL's also give timber management companies the right to the sustainable yield harvest from those lands

Western Red Cedar—A natural wood product, scientific name *Thuja plicata*, that is used as a building material in siding, decking, trim, interior accents, and timbers and beams

product used as a building material in siding, decking, trim, interior accents, and timbers and beams. Western Red Cedar grows along the Pacific coast from northern California to southeastern Alaska, occurring sporadically at its southern limit in Humboldt County, California.¹⁰ Western Red Cedar is primarily harvested from the forests of British Columbia, but Washington, Idaho, Montana, Oregon, and Alaska are also large producers. The end product varies depending on where it is sourced.

Large Western Red Cedars can reach ages of 800 to 1,000 years, and some individuals in western Washington may be 2,000 years old. Western Red Cedar products have been important since prehistoric times when native tribes living along the coasts of Washington and British Columbia used the wood for totem poles, ocean-going canoes, and large timber frame structures.¹¹

PERFORMANCE CHARACTERISTICS OF WESTERN RED CEDAR¹²

Western Red Cedar has been used in residential design for decades, but is now increasingly specified for commercial and institutional facilities such as schools, libraries, hotels, and commercial buildings. It is prized for its beauty and performance characteristics such as low density, thermal insulation, dimensional stability, acoustical properties, and sustainability.



This article continues on

<http://go.hw.net/AR062020-2>.

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SPONSOR INFORMATION



The Western Red Cedar Lumber Association represents quality "Real Cedar" producers, distributors and retailers throughout North America. Founded in 1954 and known as "the voice of the cedar industry," WRCLA offers extensive resources to assist with selection, specification and quality standards. For more information, visit RealCedar.com.

QUIZ

- What term describes a self-regulating business model that helps a company be aware of the impact they are having on all aspects of society?
 - Ethical Business Practices
 - Corporate Social Responsibility
 - Responsible Business Relations
 - Conscious Corporations
- The provincial government owns _____% of the timberland in British Columbia.
 - 10
 - 40
 - 75
 - 95
- Of the 62 million hectares of forest land in British Columbia, _____ million hectares are 3rd party certified as sustainably and responsibly managed.
 - 32
 - 42
 - 52
 - 62
- In a national survey of architects and designers, it was found that _____% of respondents couldn't identify the majority of endangered and threatened wood and only 24% were very familiar with the Lacey Act, which makes using responsibly harvested wood not only an ethical choice, but a legal responsibility.
 - 25
 - 50
 - 75
 - 99
- Which of the following describes a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle?
 - Environmental Product Declaration
 - Life Cycle Impact Assessment
 - Health Product Declaration
 - Tree Farm License
- According to the course materials, Western Red Cedar is primarily harvested in which area?
 - North Dakota
 - Minnesota
 - Maine
 - British Columbia
- Cedar's _____ enhances its insulation value and makes it an easy wood to transport and handle.
 - Low density
 - Acoustic attenuation
 - Dimensional stability
 - Flame spread index
- The flame spread rating for Western Red Cedar is _____ (Class B/Class 2 rating) and the smoke developed index is _____.
 - 45, 115
 - 35, 125
 - 45, 125
 - 55, 115
- Lumber producers have been replacing harvested trees so diligently over the last few decades that North American forests have actually grown by _____% since 1970.
 - 50
 - 20
 - 30
 - 40
- According to research presented within this course, specifying wood in building projects results in which of the following?
 - Lower greenhouse gas emissions than steel or concrete
 - Lower air pollution than steel or concrete
 - Lower water pollution than steel or concrete
 - Lower solid waste by-products than steel or concrete
 - All of the above



Inside the Unitarian Universalist Fellowship of Central Oregon, a majority of the interior walls are finished in clear Western Red Cedar T&G siding in two custom profile shapes to create warm, inviting, and extremely humane spaces. Unitarian Universalist Fellowship of Central Oregon by Hacker. Photo by Lara Swimmer.

Density

One of the lightest commercial softwoods, the density of Western Red Cedar at oven-dry conditions is approximately 21 pounds per cubic foot with a relative density (specific gravity) of 0.32. Cedar's low density enhances its insulation value and its light weight makes it an easy wood to transport and handle.

High thermal insulation

The conduction of heat in wood is directly related to its density. Woods with low density have the highest thermal insulating value because such woods contain a high proportion of cell cavities. In dry wood, these cavities are filled with air, which is one of the best known thermal insulators. With its low density and high proportion of air spaces, Western Red Cedar is the best thermal insulator among the commonly available softwood species and is far superior to brick, concrete and steel. It has a coefficient of thermal conductivity (k value) at 12% mc of 0.74 BTU inch/ft²h degrees F. The R value (the reciprocal of k) for Western Red Cedar

is 1.35R (34mm) per inch of thickness. This increases the insulation of a building by transporting less heat through interior wall paneling or exterior wall siding than brick or stone, vinyl, or gypsum drywall. This is an important characteristic since good thermal insulators help keep buildings cool in the summer, and interiors warm in cold weather, ultimately improving comfort and reducing heating and cooling costs.

Dimensional stability

Like all woods, Western Red Cedar is hygroscopic and will absorb or discharge moisture to attain equilibrium with the surrounding atmosphere. It has a very low shrinkage factor and is superior to all other coniferous woods in its resistance to warping, twisting, cupping and checking.

Acoustical properties

An important acoustical property of wood is its ability to dampen vibrations. Western Red Cedar's open cell structure means it helps block noise. As interior paneling or exterior siding, the low density of Western Red Cedar makes it an acoustical barrier of much greater quality than many products marketed for those applications

Wood has a cellular network of minute interlocking pores which converts sound energy into heat by frictional and viscoelastic resistance. Because of the high internal friction created by the cellular pore network, wood has more sound damping capacity than most structural materials. Floor, ceiling, and wall assemblies of wood can provide effective economical sound insulation and absorption when properly utilized. Western Red Cedar is particularly effective in this regard and can be used to help reduce noise or to confine it to certain areas.

Safety—Flame Spread Index

Flame spreading ratings describe the surface burning characteristics of interior finishes. They are used to regulate the use of interior finish materials to reduce the probability of rapid fire spread. Materials are burned in a test furnace for a relative assessment of flammability. The lower the flame spread rating, the more the material resists the spread of fire.

Building codes in North America generally define as interior finish any exposed material that forms part of the building interior. This usually includes interior wall and ceiling finishes, flooring, windows, doors and other wood products. US codes set the maximum flame spread rating for interior wall and ceiling finishes in most buildings at 200. The flame spread rating for Western Red Cedar is 45 (Class B/Class 2 rating).

Smoke developed classifications reflect the amount of smoke released by burning

RELIGIOUS FACILITIES

UNITARIAN UNIVERSALIST FELLOWSHIP OF CENTRAL OREGON¹⁵, BEND, OREGON

To meet all of the architectural needs at the Unitarian Universalist Fellowship of Central Oregon, the Hacker design team needed a building material that's naturally warm and welcoming, honors the natural beauty of the Pacific Northwest, and provides optimal sound reflection. They opted for Western Red Cedar. The result is a series of low, silvery grey cedar volumes that spread in a linear fashion across a slightly sloping site and harmonize with surrounding sagebrush and small groves of ponderosa pines.

For the exterior, they selected a beautiful knotty grade of Western Red Cedar T&G siding in three custom profile shapes and two finishes. Inside, a majority of the interior walls are finished in clear Western Red Cedar T&G siding in two custom profile shapes. WRC was also used for large sliding doors, a wood-paneled fireside room, and above the choir, a cedar band shell that reflects and refracts the choirs' sound.



To meet all the client's architectural needs, the Hacker design team needed Western Red Cedar because it's naturally warm and welcoming, honors the natural beauty of the Pacific Northwest, and provides optimal sound reflection. Unitarian Universalist Fellowship of Central Oregon by Hacker. Photo by Lara Swimmer.

material. They are used in conjunction with flame spread ratings to regulate the use of interior finish materials where the potential to generate smoke or control smoke movement is of major fire safety importance. US codes set the maximum smoke developed classification for interior wall and ceiling finishes in most buildings at 450. The smoke developed index for Western Red Cedar is 125.

Western Red Cedar's flame spread rating and smoke developed classification compare well with the ratings of many other species of both softwood and hardwood. Because of its favorable performance, Western Red Cedar can be used for an interior finish in some commercial building applications where other species would not be permitted.

Aesthetics¹⁴

There are few more versatile building materials than Western Red Cedar, which is ideal both for indoor and outdoor uses. Western Red Cedar lumber is available in visual stress grades for construction and finishing uses in a range of lengths, widths, and thicknesses. It is available in clear or knotty grades with smooth surfaced,

combed, or rough sawn finishes; kiln dried or unseasoned (green); flat grain or vertical grain. Western Red Cedar is pitch and resin-free. That means it will accept and hold a wide range of finishes including elegant dark stains, shabby chic bleaches, traditional solid colors, and naturally beautiful semi-transparent.

COMMERCIAL APPLICATIONS FOR WESTERN RED CEDAR

There are many commercial applications for Western Red Cedar, from siding and interior accents to trim, molding, and landscape features such as pergolas, pavilions, and decking. As an interior accent, Western Red Cedar can be used in paneling, ceilings, feature walls, and fireplace surrounds. The material can also be used for doors and windows, blinds and shutters, and as a show-stopping room divider.

ENVIRONMENTAL BENEFITS OF WESTERN RED CEDAR¹⁶

There are many environmental benefits of wood in general, and Western Red Cedar more specifically. These include renewability, recyclability, durability, reduced energy consumption, and minimal greenhouse gas

emissions. In addition, Western Red Cedar products from WRCLA members come from forests that are independently certified as legal, sustainable, and renewable. And, Environmental Product Declarations (EPDs) are readily available for Western Red Cedar products so that architects can ensure they are specifying an environmentally responsible material.

Renewable, Recyclable, and Biodegradable

Wood is the only major building material that's renewable, which is why Canada's forest base is still abundant after 150 years of harvesting. For every tree that's harvested, at least 3 (and up to 8) are planted. Timber manufacturers are required to re-plant species in-kind. For example, if 60% of Douglas Fir are logged from a forest, they must re-plant 60% Douglas Fir. Lumber producers have been replacing harvested trees so diligently over the last few decades that North American forests have actually grown by 20% since 1970.¹⁷

In addition, wood is readily recyclable and biodegradable. Man-made materials—including brick, cement, and composite products—don't break down like wood does once it's discarded and are more difficult to recycle.

Durable

Wood is durable, allowing it to last a very long time, which reduces material consumption versus other building materials that must be replaced more often. There are numerous examples of historic wood buildings around the globe that are still standing after thousands of years. For example, the world's oldest surviving wood structure, built in 607 A.D. more than 1,300 years ago, is the Horyuji Temple in Japan. The Buddhist temple became Japan's first UNESCO World Heritage Site in 1993.¹⁸ Another long-standing wooden structure is the Great Eastern Temple in Japan's Nara province, built in the early 8th century A.D. When it was constructed, it was one of the largest wooden structures in the world, measuring 187 feet long by 164 feet wide.¹⁹

In the United States, colonists took advantage of the vast virgin forests and built primarily with timber. Some examples of existing wood buildings from the early days of this country include the Fairbanks House in Dedham, MA (circa 1637), which was verified

EDUCATION FACILITIES

KAWARTHA TRADES & TECHNOLOGY CENTRE¹⁵, PETERBOROUGH, ONTARIO, CANADA

The Perkins + Will team ensured the Kawartha Trades and Technology Centre at Fleming College's Sutherland Campus, would imbue a welcoming vibe was through the inclusion of a warm, expansive, 20m cantilevered overhang at the main entrance. For the soffit of this key entryway feature, they opted for a knotty grade of naturally beautiful Western Red Cedar. The choice of cedar helped complement the more industrially inspired palette of poured concrete, fiber reinforced cement panels, and Corten steel used for the building cladding, while at the same time maintaining the commitment within the design to naturally sourced materials.

As part of the project's LEED Gold certified status, the design team also needed a material that was environmentally sound, and since the overhang extended outside, it had to be a material that could stand up to the elements. Western Red Cedar was chosen for its natural durability in resisting moisture and rot within an exterior application. It was also



The Perkins + Will team ensured a welcoming vibe through the inclusion of a warm, expansive, 20m cantilevered overhang at the main entrance. The soffit of this key entryway feature is a knotty grade of naturally beautiful Western Red Cedar. Kawartha Trades and Technology Centre by Perkins + Will. Photo by Tom Arban and Scott Norsworthy.

chosen for its naturally renewable properties in supporting the overall sustainable vision of the building and for its natural warmth and beauty at this prominent location.

using dendrochronology to be the oldest house in the United States of timber frame construction.²⁰ The Thomas Lee House in East Lyme, CT (circa 1660), is one of the oldest wood-frame houses in Connecticut and is still in its primitive state.²¹ On the west coast, the Dr. John McLoughlin House in Oregon City, OR was built in 1846. It is a two-story wooden building constructed of lumber from the nearby Willamette Falls Mill and still has its original siding.²²

Speaking specifically to the historic use and durability of Western Red Cedar, native peoples of the Pacific coast prized the species for its long lasting qualities and used wood and bark from cedar trees for most of their building needs. Evidence of cedar's durability are the many cedar artifacts still in good condition today.

Properly finished and maintained, cedar will deliver decades of trouble-free service. If exposed for prolonged periods to conditions where decay could be a factor, such as where the wood is in contact with the ground, cedar should be treated with suitable wood preservatives.

Reduces Energy Consumption

According to an independent study that compared how much energy is needed to obtain, manufacture, transport, and install building materials for identical wood frame, steel frame, and concrete houses, wood products require much less energy to produce than concrete or steel. Wood products make up 47 percent of all raw material manufactured in the United States, but their share of manufacturing energy consumption is only 4 percent. Steel requires 21 times the energy to produce and releases more than 15 times sulfur dioxide when compared to wood. These findings prove, once and for all, that wood is environmentally superior to alternative materials. Additionally, wood possesses naturally occurring thermal properties and insulates better than steel and concrete, so it saves even more energy and money when heating and cooling buildings.

Reduces Greenhouse Gasses and Reverse Climate Change

Cedar, along with other wood products, has the lowest impact of all building materials on

air and water quality because manufacturing of wood products produces far fewer toxins and greenhouse gases than the leading man-made materials. On the contrary, natural wood products like cedar play a vital role in reversing climate change. This is because the regeneration of forests after harvest creates new trees, which take in carbon dioxide and release oxygen as they grow. As trees mature, they capture less carbon and when the tree dies, or is consumed by wildfire or infestation, the carbon goes back into the environment or is released. However, when the mature tree is harvested, the carbon remains stored in the wood, and new trees are grown to replace the cycle. Because wood is 50% carbon by dry weight, using wood products keeps this cycle going.²³

Economic and Social Impacts

The forestry industry has a significant economic and social impact where it operates. In British Columbia, there are 5,300 forest industry professionals, more than the entire rest of the country combined. Port McNeill, B.C., where 82% of the population derive their economy and raise their families in forestry, is a good example. First Nations people in British Columbia are heavily invested in the forest sector for business and they are engaging their youth in the industry so they can have a stronger and healthier future.

HARVESTED FROM SUSTAINABLY MANAGED FORESTS

Western Red Cedar is green by nature, but certification is a bonus for consumers looking for an added assurance. Forest companies operating in British Columbia must meet or exceed the high forest management standards demanded by government. In addition, they also have a high level of third-party certification, which gives customers added assurance that they are practicing responsible and sustainable forest management. The forests are assessed by independent, third-party evaluations according to rigorous, measurable, and scientific criteria that include ensuring protection of biodiversity and preserving soil and water quality.

More than 85 percent of timberland in British Columbia, Canada—where most

Western Red Cedar comes from—is certified by internationally recognized independent forest certification agencies such as CSA (Canadian Standards Association), SFI (Sustainable Forestry Initiative), and FSC (Forest Stewardship Council). CSA is a national standard for sustainable forest management. It covers operations in Canada. The Forest Stewardship Council is an international system covering forest management practices and the tracking and labeling of certified products and paper products with recycled content. The Sustainable Forestry Initiative® Program is a sustainable forest management standard targeting large industrial operations in Canada and the United States. The USGBC, who oversees many of the green building rating systems in North America, recognizes all three programs.

Brad Kirkbride, Managing Director of the Western Red Cedar Lumber Association, advises architects interested in specifying certified wood products to obtain lumber from one of the respected certifying bodies. "With 90 percent of the world's forests uncertified, what's important is making sure your forest product is independently certified," he says. "We're strong supporters of third party certification—and some certification is far better than no certification at all."

Life Cycle of Western Red Cedar

In evaluating the environmental impact of building design, the impact on the quality of air, water, and soil must be taken into consideration. This includes not only minimizing waste products from the building, such as wastewater, solid wastes, and chemicals, but also minimizing the pollution caused by the manufacture of the materials used in the building.

It is difficult, however, for designers to determine whether the materials they choose cause air or water pollution during their extraction, manufacture, and transportation to the site as these occur away from the project. Designers may be aware that the manufacture of concrete creates CO₂ emissions and that steel manufacture results in toxic chemicals being released into the water, but are not aware of a means to evaluate these effects. Life cycle analysis is an emerging science

There are four stages of an LCA.

- **Goal and Scope Definition**—Goals, system boundaries, and intended uses are established.
- **Life Cycle Inventory**—A data-based quantification of energy and raw material requirements, air emissions, waterborne effluents, solid waste and other environmental releases through the life of a product or process.
- **Life Cycle Impact Assessment**—An evaluation of the effects of the environmental information collected in the inventory. A full impact assessment addresses ecological and human health, as well as the range of social, cultural and economic effects. These may include global warming potential, acidification potential, eutrophication potential, smog potential, ozone depletion potential, feedstock energy, and freshwater use.²⁴
- **Life Cycle Improvement Analysis**—Identification of areas where environmental impacts can be reduced or mitigated within the life cycle of the product or processes.

that evaluates and allows designers to compare the effect that materials have on the environment over their lifetime.

Life cycle assessment (LCA), also known as cradle-to-grave or cradle-to-cradle analysis, is a rigorous study of inputs and outputs over the entire life of a product or process and the associated environmental impact of those flows to and from nature. It acknowledges that all phases of a product’s life have an impact on the environment and these impacts can be quantified and compared. The

LCA assesses those impacts from the time materials are extracted through manufacture, transportation, storage, use, recovery, reuse and disposal. Life cycle assessments are gaining traction in North America as companies look to give credence to their environmental claims.

“Every product will have some impact on the environment,” says Brad Kirkbride of WRCLA. “What the LCA will do is to identify those products that use more resources, generate more pollution, waste, or other unfavorable impacts than others, and in that way distinguish the products that are harmful from those that are reasonably environmentally sound. Manufacturers must identify the environmental footprint of their products. Currently, the best way to accomplish this is through an ISO-compliant LCA—that’s the gold standard.”

ATHENA Sustainable Materials Institute²⁵

In Canada, the ATHENA™ Sustainable Materials Institute has developed databases and a computer program to evaluate the environmental impacts of whole buildings and building assemblies. In the US, the federal government has funded the first phase of a project, led by the ATHENA™ Sustainable Materials Institute, to develop a life-cycle inventory for a range of materials including building materials and products. The second phase of the project is now getting underway.

ATHENA™’s life-cycle research proved that when it comes to minimizing external pollution of air, water or soil, wood far

surpasses other materials and wood building products have the lowest environmental impact when compared to other major building materials. Research demonstrated that using wood results in:

- Lower greenhouse gas emissions than steel or concrete
- Lower air pollution than steel or concrete
- Lower water pollution than steel or concrete
- Lower solid waste by-products than steel or concrete

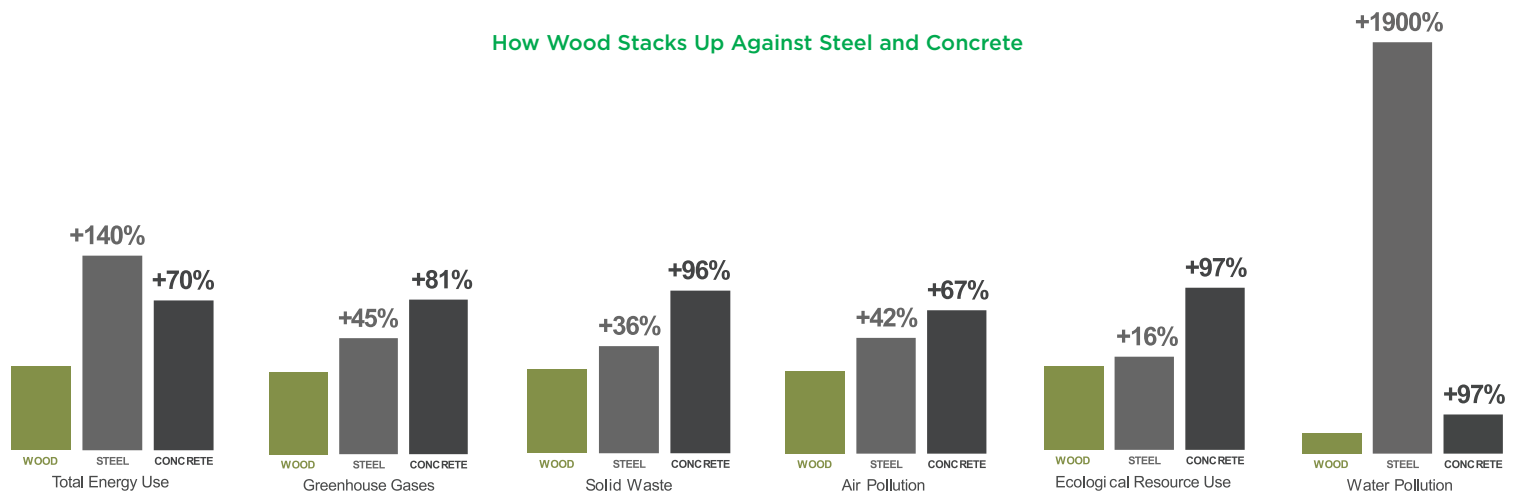
***See the charts below to see how wood stacks up against steel and concrete.

Western Red Cedar vs. Composites

Composites have been gaining steam for siding, decking, and landscape applications in recent years but there are significant downsides to these materials as opposed to Western Red Cedar. Many composite materials go straight to the landfill and do not decompose readily. Trim ends and breakage from composite products ends up in landfills as well, and typically contain plastic or silica dust. Western Red Cedar sawdust and chips, on the other hand, are biodegradable. Typically chips and sawdust are used for pulp or power generation at manufacturing facilities.

Composites may be made out of some recycled material, but enormous amounts of energy are required to manufacture these products and greenhouse gases are emitted during production, which have a deleterious effect on global warming.

How Wood Stacks Up Against Steel and Concrete



Environmental Product Declarations (EPDs)²⁶

Life cycle assessments are a primary tool used to create Environmental Product Declarations (EPDs) for specific products. Think of an EPD as a nutrition label for a building product—it's a transparency document detailing what's in a product and how it was manufactured. EPDs report environmental impacts based on established life cycle impact assessment (LCIA) methods. According to SCS Global Services, an Eligible EPD Program Operator under the American National Standards Institute (ANSI), "An EPD is a transparent, objective report that communicates what a product is made of and how it impacts the environment across its entire life cycle. A verified EPD can earn products credits for LEED v4 and other green building rating systems."

The reliability, transparency, and quality of Environmental Product Declarations are determined by three things:

- **Product Category Rule (PCR)**—The international standard governing EPDs (ISO 14025) requires that certified EPDs be prepared in accordance with Product Category Rules meeting specific criteria. PCRs define the product category, describe the scope of the life cycle assessment (LCA) to be conducted, and identify the types of potential impacts that must be evaluated and reported.
- **LCA Study**—The LCA is typically conducted by a recognized neutral third-party, in accordance with international LCA standards (ISO-14040 series). The assessment must, at a minimum, address each environmental or human health impact identified in the PCR.
- **EPD Report**—The quality of the resulting EPD is based on the findings of this assessment. It must disclose all information required in ISO 14025 and defined in the PCR, including a description of the study scope, the product, results, and additional environmental information about the product.

EPDs are available for the following Western Red Cedar products

- Decking
- Siding
- Lumber

These EPDs address products from multiple manufacturers and represent an average for the membership of the Western Red Cedar Lumber Association (WRCLA), a non-profit trade association representing manufacturers of Western Red Cedar products. This average is based on a sample that included three remanufacturing mills (two in BC and one in Washington, US), which represented 18% of industry production in 2014. These data are combined with Athena Sustainable Materials Institute western red cedar resource extraction inventory updated using recent in-house coastal harvesting data, a survey of cedar nursery production in BC, and CORRIM (The Consortium for Research on Renewable Industrial Materials) forest management data.

SINGLE- AND MULTI-FAMILY RESIDENTIAL

HORIZON NEIGHBORHOOD²⁷, POWDER MOUNTAIN, UTAH

Building an intentional community 9,000 feet above sea level on Powder Mountain doesn't come without its challenges—high wind loads, high seismic loads, extreme snowfall, extreme topography and high solar gain, to name a few. MacKay-Lyons Sweetapple Architects was more than up to the task. The award-winning, Nova Scotia-based firm is internationally renowned for creating stunning and sometimes gravity defying structures that respond to "place" in very dramatic ways.

The goal here was to develop a sustainable, modern mountain architecture that responds to the local climate and landscape. Mission accomplished. Horizon Neighborhood's architecture is both traditional and contemporary, and it's a coherent community that exemplifies both unity and variety.

"Close your eyes and imagine a neighborhood consisting of a dense aggregation of cedar cabins perched on stilts, clustered around communal courtyards and accessed by forty-foot steel bridges," says Brian MacKay-Lyons, Principal of MacKay-Lyons Sweetapple Architects. "The bridges enable year-round entry from the second level of each structure. The stilts also form the primary structural frames, which support the cabins from extreme wind and potential seismic loads."

The design is based on the client's culture of creativity and environmental stewardship, which is especially important because the mountain is part

CONCLUSION

We hope you now have a better understanding of forest management and how Western Red Cedar is a renewable and sustainable building material that can be used in a variety of construction applications. From residential and commercial to institutional and religious projects, Western Red Cedar lends unrivaled beauty and warmth when used in both interior and exterior applications. Environmental Product Declarations available for Western Red Cedar products prove the material's sustainability and provide architects and their client's assurance that they are specifying a durable and recyclable material that does not have negative repercussions for the environment. ■



To help minimize the project's overall footprint, MacKay-Lyons specified naturally beautiful Western Red Cedar for the shingled roofs, the vertical cedar wall cladding, and the soffits. Horizon Neighborhood by MacKay-Lyons Sweetapple Architects. Photo by Doublespace Photography and Paul Bundy

of Utah's fragile high desert landscape. So, using the stilts—rather than concrete foundations—ensures the buildings touch lightly on the land minimizing the project's overall footprint. As does the choice of building material. MacKay-Lyons specified naturally beautiful Western Red Cedar for the shingled roofs, the vertical cedar wall cladding, as well as the soffits. "While not grown locally, cedar is the local vernacular for agricultural buildings in the area, and it is the most durable and long-lasting wood cladding material," he says adding, "the use of WRC was consistent with the client's values."

ABOUT THE RESEARCHER | WRITER

Paige Lozier is an experienced writer of digital and print publications, primarily within the design and construction industries. She received a Bachelor's degree in Interior Design and a Master's degree in Historic Preservation from the University of Georgia.

ENDNOTES

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- ² https://www.sfmcanada.org/images/Publications/EN/BC_info_Province_and_territories_EN.pdf
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- ²³ <https://web.fpinnovations.ca/>
- ²⁴ <https://www.realcedar.com/wp-content/uploads/2018/03/Typical-Cedar-Siding-EPD-February-2018.pdf>
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- ²⁶ <https://www.scsglobalservices.com/environmental-product-declarations>
- ²⁷ WRCLA Cedar Book XIII, Page 27-32, 2020