



LEED v4.1: Understanding the Changes and Implications for Wood Use

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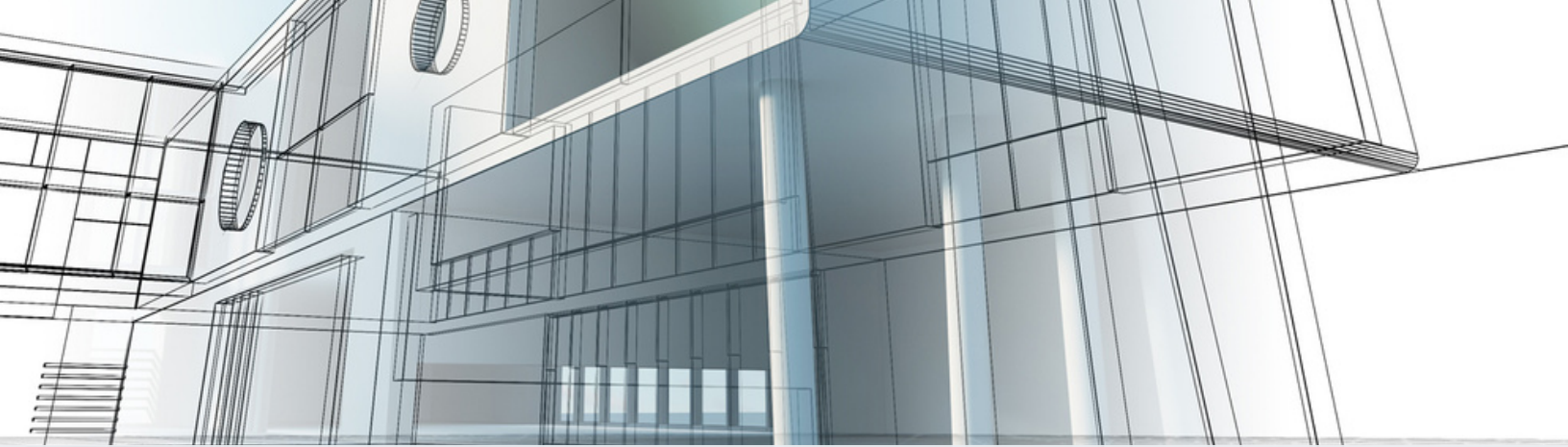
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Executive Summary

In 2013, the U.S. Green Building Council (USGBC) launched Leadership in Energy and Environmental Design v4 (LEED v4) and Dovetail Partners provided a report that evaluated the changes and implications for use of wood as a building material and within green building projects.¹ Some of the most substantial changes in LEED v4 were made to the Materials and Resources credit category with direct impact to the use of wood. To provide the most current information for green building projects, this new report examines the changes associated with the adoption of LEED v4.1.² The transition to LEED v4.1 was disrupted by the COVID-19 pandemic,³ and the deadline for project registrations under older standards was continued through June 30, 2022. Since that deadline has passed, new project registrations and certifications are now under LEED v4 or v4.1, and as of April 21, 2023, LEED v4 project registrations must use the most recent addenda versions of LEED v4.1 credits.⁴ As of August 2023, there are 13,693 LEED v4.1 projects globally, including 9,844 LEED v4.1 projects in the United States and 653 in Canada.⁵

This report builds from the previous review of LEED v4, and readers are directed to revisit that prior report for additional context.⁶ This new report focuses on the LEED v4.1 standard and examines the Building Design + Construction (BD+C) rating system, changes to the Materials and Resources credits, and possible impacts to the use of wood. Based upon this examination, there are changes in LEED v4.1 that can support the more efficient documentation of specific credits related to sourcing materials and may positively impact the use of wood if the required product information continues to be made available by manufacturers. Also, the approach to recognizing legal, responsible, and certified sources of wood, which was a pilot credit in earlier standards, continues to be recognized. Overall, the changes can be described as reflecting feedback from the marketplace to improve participation and project outcomes. LEED v4.1 provides modest updates and addresses a goal of improving credit uptake, including the whole building life cycle assessment (WBLCA) credit and expanding the Environmental Product Declaration (EPD) credit usage, both of which have been successful. These changes have increased awareness of the role of embodied carbon and contributed to mainstreaming these practices in codes and procurement policies. The full impact of LEED v4.1 will emerge as the standard is more widely used; meanwhile, LEED v5 is in development with a draft anticipated in 2023.⁷

¹The report, LEED v4: Understanding the Changes and Implications for Use of Wood as a Building Material, is available at: <https://www.dovetailinc.org/portfoliodetail.php?id=5e2f09ba4d8f6>

²Main webpage for information about LEED v4.1: <https://www.usgbc.org/leed/v41>

³Extension gives LEED 2009 projects more time to certify | U.S. Green Building Council

⁴Starting April 21: New guidelines for LEED v4.1 credit substitutions | U.S. Green Building Council

⁵LEED project profiles | U.S. Green Building Council (Accessed August 17, 2023)

⁶LEED v4: Understanding the Changes, Implications for Use of Wood

⁷Public LEED v5 Draft Expected in 2023 (CAGBC, 2023)

With the wood industry's commitment to provide responsible sources of wood, Life Cycle Assessment (LCA) findings, and published Environmental Product Declarations (EPDs) to the marketplace, the LEED v4.1 standard can allow wood to be a valued material for green building projects. However, the LEED v4.1 standard, first made available in 2018, does not reflect the latest research that has added to the understanding that wood and other bio-based materials provide unique opportunities to mitigate climate change, enhance forest health and resiliency, contribute to managing wildfire risks and impacts, and many other ecological, economic, and social benefits. In terms of climate benefit, recently published research has concluded that the estimated total carbon impact of the evaluated mass timber projects, including avoided emissions and carbon storage in wood, averaged 0.38 tCO₂e/m² of floor space,⁸ representing carbon values ranging into the millions of dollars.⁹ This carbon benefit is comparable to avoiding the emissions of a barrel of oil for every square meter of mass timber construction.¹⁰

Overall, the changes from LEED v4 to LEED v4.1 may result in credits that are easier to achieve and more in alignment with what is available in the marketplace,¹¹ but the overall opportunity for wood products to contribute to a LEED project remains about the same.¹¹ Mass timber includes elements like glulams, which have been in the code for decades and cross-laminated timber (CLT) was first recognized in the 2015 International Building Code (IBC), which has been widely adopted or surpassed. Recognizing that LEED v4.1 was first made available for project registrations in 2018, it is understandable that it doesn't reflect the developments that have occurred in the past five years in relation to innovative wood products and the growing understanding of the multiple benefits of wood as a construction material. Tall mass timber provisions (including the new construction types) were introduced in the 2021 IBC and has been adopted by at least 24 states.¹² Advances in responsible sourcing, such as the Wood Sourcing Tool,¹³ and the availability of reclaimed wood products contribute to greater circularity.¹⁴ At the same time, there is increased recognition of renewable wood energy systems and wood products such as biochar as effective decarbonization strategies for heavy industry and for advancing the technologies of carbon capture and storage.¹⁵

As USGBC continues to work on LEED v5, it will be important to recognize the recent developments as well as long known benefits of wood and potentially consider a whole new approach to providing credit for the choice of wood as a preferred material for demonstrating leadership in environmental design.

⁸ tCO₂e/m² = tonnes of carbon dioxide equivalent per square meter

⁹Taylor A, Gu H, Nepal P, Bergman R. 2023. Carbon credits for mass timber construction. *Business BioProducts Business* 8(1), 2023, pp. 1–12.

<https://doi.org/10.22382/bpb-2023-001>

¹⁰One barrel of oil is equivalent to an estimated 0.43 metric tons of CO₂ emissions ([EPA, 2023](#)).

¹¹ An estimated 10 to 12 points may be viewed as related to wood product choices. This estimate is discussed in greater detail in the 2014 report.

¹²Data reported as of August 2023, for the most current information, see: [Status of Building Code Allowances for Tall Mass Timber in the IBC - WoodWorks | Wood Products Council](#)

¹³[How can I tell if wood is sustainably sourced?](#) (Wood Sourcing Tool, Accessed June 23, 2023).

¹⁴[ReuseWood - Business Directory and Guide](#)

¹⁵For further discussion of these opportunities, see: [Carbon Capture Technologies and Natural Climate Solutions: 1+1 = 3](#) (Dovetail Partners, 2023)





Background

In 2013, the U.S. Green Building Council (USGBC) launched LEED v4 and Dovetail Partners provided a report that evaluated the changes and implications for use of wood as a building material and within green building projects.¹⁶ Described as a "quantum leap," LEED v4 was said to speed up the credit submittal process for design teams and encouraged building owners to better understand building maintenance and operation. New standards and credit categories were developed as part of LEED v4, and the list of rating systems expanded to include data centers, warehouses and distribution centers, hospitality facilities, existing schools, existing retail, and mid-rise residential projects. Two credit categories – Location and Transportation, and Integrative Process – were also added. Other changes in LEED v4 included introduction of prerequisites requiring metering of energy and water use, and establishment of specific energy performance requirements. In addition, minimums were established in the Energy and Atmosphere, and Location and Transportation credit categories.

Perhaps the most substantial changes in the LEED v4 program were made to the Materials and Resources credit (MRC) category. Brand new in LEED v4 were optional credits related to life cycle assessment (LCA),¹⁷ LCA-based environmental product declarations (EPDs),¹⁸ material ingredient verification, and transparent reporting of raw materials sourcing. In addition, the list of environmentally-preferable products was redrawn so as to narrow the definition of 'locally sourced products', exclude 'rapidly renewable materials', and add a new 'bio-based products' category.

Terminology and Acronyms

EPD - Environmental Product Declaration: a standardized report of environmental impacts linked to a product or service.

LCA - Life Cycle Assessment: a mechanism for systematically evaluating the environmental impacts linked to a product or process and in guiding process or product improvement efforts.

LEED - Leadership in Energy and Environmental Design: a green building rating system developed by the USGBC.

PCR - Product Category Rules: Requirements for the information to be gathered and evaluated in preparing an EPD.

USGBC - United States Green Building Council: founded in 1993, a non-profit organization representing the industry on environmental building matters.

¹⁶The report, LEED v4: Understanding the Changes and Implications for Use of Wood as a Building Material, is available at: <https://www.dovetailinc.org/portfoliodetail.php?id=5e2f09ba4d8f6>

¹⁷For more information about LCA methodologies, see *A Review of Life Cycle Assessment Tools*, available at: <https://dovetailinc.org/portfoliodetail.php?id=5e26267427df2>

¹⁸For more information, see *Environmental Product Declarations: What, Why, How*, available at: <https://dovetailinc.org/portfoliodetail.php?id=5e3092e434d4d>

The LEED v4 standard created a learning curve in raw materials markets and supply chains. By asking for extraction locations and practices, and documentation of supplier commitments to responsible practices, new information was being sought from raw material suppliers, manufacturers, and distributors who were largely unaccustomed to these requests. The new credits related to LCA and LCA-based tools also created opportunities to quantify environmental advantages of wood and engineered products made of wood. Low embodied carbon and wood's ability to store massive quantities of carbon for long periods of time will continue to gain in importance for reducing and avoiding construction related emissions (see sidebar).

Similar to the prior report by Dovetail Partners that addressed the changes in LEED v4,¹⁹ this new report examines the changes associated with the adoption of LEED v4.1. With the launch of LEED v4.1 project registration opportunities in 2018, the intention was for the updated program to be "an accessible, user-friendly and agile tool to address the most pressing issues of today and tomorrow."²⁰ However, the transition to LEED v4.1 was disrupted by the COVID-19 pandemic, and the deadline for project registrations under older standards was continued through June 30, 2022.²¹ Since that deadline has passed, new project registrations and certifications are now under LEED v4 or v4.1 and the market interest in understanding these programs has risen. Since June 2022, projects have been able to also substitute v4.1 credits within a v4 project;²² however, as of April 21, 2023, new LEED v4 project registrations must use the most recent addenda versions of LEED v4.1 credits.²³ It is worth noting that development of LEED v5 is underway. The process of development began in January 2023, and a draft of LEED v5 is anticipated before the end of the year.²⁴



The Promise of Mass Timber

Why Upfront Carbon Matters

Construction emissions, often called upfront carbon, include emissions from raw material extraction, processing, transporting, and onsite construction. Conventional materials can account for close to 90% of those emissions in medium-rise (8- to 18-story) buildings, but by designing with mass timber, these upfront emissions can be reduced up to 44%.^{*} For a new medium-rise office building (8 to 18 stories), around 90% of upfront emissions are due to the production of concrete (~75%) and steel (~15%). Emissions from upfront carbon are particularly important today because they immediately add CO₂ to the atmosphere. Although the concrete and steel industries are beginning to reduce their emissions, it is a slow and challenging process. All of the upfront fossil emissions are released into the atmosphere before the building is occupied. And those emissions remain in the environment well beyond the life of the building. A mass timber medium-rise office building in the Pacific Northwest is estimated to have 30% to 44% less upfront carbon than a conventional concrete and steel design. Tall mass timber buildings displace carbon-intensive building materials such as concrete and steel with long-lived biogenic carbon. This keeps fossil carbon in the ground and supports forests as a stable carbon sink.

**This estimated reduction is from a specific study, and this is not an absolute number. Some projects could see upfront carbon reductions of more than 44%, depending on the structure, the baseline used for comparison, and many other factors.*

Excerpted from: The Promise of Mass Timber, <https://odfmasstimber.com/why-upfront-carbon-matters-more-today/#MassTimberNow>

19 Main webpage for information about LEED v4.1: <https://www.usgbc.org/leed/v41>

20 Registration is open for LEED v4.1 new buildings and spaces | U.S. Green Building Council

21 Extension gives LEED 2009 projects more time to certify | U.S. Green Building Council (USGBC, 2020)

22 Starting April 21: New guidelines for LEED v4.1 credit substitutions | U.S. Green Building Council (USGBC, 2023)

23 Join a LEED v5 consensus committee | U.S. Green Building Council (USGBC, 2023)

24 Public LEED v5 Draft Expected in 2023 (CAGBC, 2023)



Basic LEED Standard Framework

In LEED v4.1, as in previous versions, areas of focus are defined as credits or credit categories. Within each category there is an opportunity to earn one or more points by meeting various criteria. The number of possible points remains at 110 in v4.1, with 100 of the points derived from credits within the impact areas and additional “bonus” points offered for specific add-ons (i.e., work with a LEED Accredited Professional for 1 point, compliance with provisions that match areas of regional priority up to 4 points, and innovation up to 5 points). Thresholds for attainment of various certification levels remain unchanged with 40-49 points needed for certification, 50-59 for silver, 60-79 for gold, and 80-110 for platinum.

The following table summarizes credit changes from LEED v4 to LEED v4.1 in the categories of Materials & Resources, Indoor Environmental Quality, and Innovation + Regional Priority (Table 1). The major changes in these categories within the Building Design + Construction (BD+C) rating system are addressed in this report within the context of application and impact to the use of wood products in a LEED project and with a focus on the Materials & Resources credits. The credits labeled with a “p” are pre-requisites for LEED and do not result in a project earning points. The credits labeled with a “c” offer the opportunity for projects to earn points.



Table 1. LEED v4 to LEED v4.1 Credit Changes in Materials & Resources, Indoor Environmental Quality, and Innovation + Regional Priority (Building Design + Construction)

	Major Changes	Minor Changes	No Changes
Materials & Resources	MRc Building Life-Cycle Impact Reduction MRc Building Product Disclosure and Optimization Environmental Product Declarations MRc Building Product Disclosure and Optimization Sourcing of Raw Materials MRc Building Product Disclosure and Optimization Material Ingredients MRc Construction and Demolition Waste Management	MRp Construction and Demolition Waste Management Planning MRc Furniture and Medical Furnishings**	MRp Storage and Collection of Recyclables MRc PBT Source Reduction Mercury** MRc PBT Source Reduction Lead, Cadmium, and Copper** MRc Design for Flexibility**
Indoor Environmental Quality	EQp Minimum Indoor Air Quality EQc Low-Emitting Materials EQc Indoor Air Quality Assessment EQc Acoustic Performance	EQp Environmental Tobacco Smoke Control EQc Enhanced Indoor Air Quality Strategies EQc Construction Indoor Air Quality Management Plan EQc Thermal Comfort EQc Daylight	EQp Minimum Acoustic Performance* EQc Interior Lighting EQc Quality Views
Innovation & Regional Priority	Inc Innovation		Inc LEED Accredited Professional Regional Priority

* Schools Only **Healthcare Only

Source: <https://www.usgbc.org/sites/default/files/CreditMappingBDC.pdf>

Overview of General Changes in LEED v4.1

The changes from LEED v4 to LEED v4.1 include meaningful clarifications (including updated guidance documents) and, overall, the changes in v4.1 can be described as reflecting feedback from the marketplace to improve participation and project outcomes. The beta version helped with efforts to gather feedback for the updating process.²⁵ USGBC asserts that, “LEED v4.1, raises the bar on building standards to address energy efficiency, water conservation, site selection, material selection, day lighting, and waste reduction.”²⁷

²⁵ LEED Link: [LEED v4.1 guides | U.S. Green Building Council](#)

²⁶ For information about the beta version and feedback, see: [LEED Link: LEED v4.1 guides | U.S. Green Building Council](#) (video linked in article). For additional discussion of credit use in previous versions of LEED, see: [LEED Version 4.1: Biggest Story at Greenbuild 2017](#) (SIG, 2018)

²⁷ [LEED v4.1 | U.S. Green Building Council](#) (Accessed June 29, 2023)

LEED v4.1 Rating Systems and Projects

The LEED v4.1 standard includes various rating systems for specific project types as listed below.

Ratings Systems within the LEED v4.1 standard

- Building Design + Construction
- Interior Design + Construction
- Operations + Maintenance
- Residential²⁸
- Cities + Communities
- Recertification

As shown in Table 2, as of August 2023, the USGBC website reports 13,693 projects are registered with the LEED v4.1 rating system globally. USGBC also reports that globally 5,114 LEED v4.1 projects have been completed and achieved some level of certification.²⁹ As shown in Table 2, 73% of all global LEED projects are in the U.S., including 72% of LEED v4.1 projects.³⁰

Table 2. LEED Projects Globally, in the USA, and in Canada for all Rating Systems, LEED v3, LEED v4, and LEED v 4.1

	All LEED rating systems	LEED v3 (2009)	LEED v4	LEED v4.1
Global	165,345	45,976	39,206	13,693
U.S.	120,311	32,228	20,137	9,844
Canada	4,148	413	2,495	653

Source: USGBC Projects, <https://www.usgbc.org/projects> Accessed 17 August 2023.

There are 9,844 LEED v4.1 projects registered in the U.S, and of these projects 87% are LEED Residential BC+D: Single-Family projects,³¹ 8% are LEED: Operations + Maintenance (O+M), 2% are LEED BC+D: New Construction (NC)³², 1% are LEED Interior Design + Construction (ID+C), and the remaining 2% are distributed across approximately 10 other rating systems (Figure 1).³³

²⁸ Previously Homes and Multifamily were under the BD+C umbrella. Now Residential has BD+C Homes, BD+C Multifamily, and Core & Shell Multifamily (although Core & Shell is not applicable in the U.S. and Canada).

²⁹ [LEED project profiles | U.S. Green Building Council](https://www.usgbc.org/leed/v41#residential) (Accessed August 17, 2023)

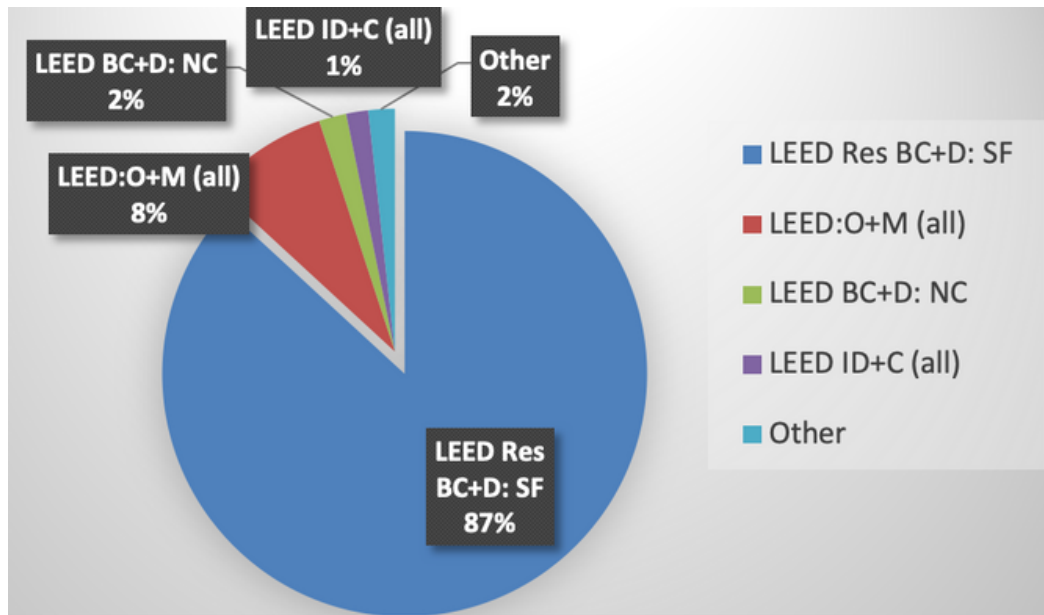
³⁰ For older standards such as the v1 pilot and v2, the U.S. represented over 80% of projects.

³¹ This rating system includes: *New single-family homes that are attached or detached, and multifamily buildings with up to four units.* <https://www.usgbc.org/leed/v41#residential>

³² This rating system includes: New construction or major renovation of buildings that do not primarily serve residential, K-12 educational, retail, data centers, warehouses and distribution centers, hospitality or health care uses. <https://www.usgbc.org/leed/v41#bdc>

³³ For comparison, of the 20,137 LEED v4 projects in the U.S., 32% are LEED BD+C: Homes, 6% Multi-family; 26% NC, 10%, ID+C (all); 9% Commercial Interiors; and 8% O+M (all). (This summary accounts for 91% of all U.S. LEED v4 projects registered in the U.S.) [LEED project profiles | U.S. Green Building Council](https://www.usgbc.org/leed/v41#residential) (Accessed August 17, 2023)

Figure 1. U.S. Registered LEED v4.1 Projects (% per Rating System)



Source: LEED project profiles | U.S. Green Building Council (Accessed August 17, 2023)

Within the LEED v4.1 projects in the U.S., 3,672 (37%) have been completed and achieved some level of certification, including 3,298 (90%) that utilized the LEED Residential BD+C: Single Family rating system. Of the 180 LEED v4.1 projects in the U.S. using the LEED BD+C: NC rating system, two projects have been completed and achieved certification under this system.³⁴

There are 653 LEED v4.1 projects in Canada, of which 416 (64%) are LEED Residential BD+C: Single Family, 185 (28%) are LEED O+M, and 27 (4%) are LEED BD+C: NC (accounting for 96% of the registered projects). Of the LEED v4.1 projects registered in Canada, 276 (42%) are certified and 217 (79%) of these are BD+C, Residential, Single Family. There is also one LEED BD+C: NC certified project located in Ontario, Canada.³⁵

³⁴ A fire station project in Boise, Idaho, see: <https://www.usgbc.org/projects/orchard-training-area-ota-fire-station> and a credit union in Menasha, Wisconsin, see: <https://www.usgbc.org/projects/covantage-credit-union-menasha-wi>

³⁵ LEED project profiles | U.S. Green Building Council (Accessed August 17, 2023)

Changes to the Building Design + Construction (BD+C) Rating System in the LEED v4.1 Standard

The Building Design + Construction (BD+C) rating system for LEED v4.1 includes a range of diverse commercial project types and focuses on projects that include new construction and major renovation.

- **New Construction and Major Renovation.** New construction or major renovation of buildings that do not primarily serve residential, K–12 educational, retail, data centers, warehouses and distribution centers, hospitality or health care uses.
- **Core and Shell Development.** Buildings that are new construction or major renovation for the exterior shell and core mechanical, electrical, and plumbing units, but not a complete interior fit-out. LEED BD+C: Core and Shell is the appropriate rating system to use if more than 40% of the gross floor area is incomplete at the time of certification.
- **Schools.** Buildings made up of core and ancillary learning spaces on K–12 school grounds. LEED BD+C: Schools may be used for higher education and nonacademic buildings on school campuses.
- **Retail.** Buildings used to conduct the retail sale of consumer product goods. Includes both direct customer service areas (showroom) and preparation or storage areas that support customer service.
- **Data Centers.** Buildings specifically designed and equipped to meet the needs of high-density computing equipment such as server racks, used for data storage and processing. LEED BD+C: Data Centers only addresses whole-building data centers (greater than 60%).
- **Warehouses and Distribution Centers.** Buildings used to store goods, manufactured products, merchandise, raw materials or personal belongings, such as self-storage.
- **Hospitality.** Buildings dedicated to hotels, motels, inns or other businesses within the service industry that provide transitional or short-term lodging, with or without food.
- **Healthcare.** Hospitals that operate 24 hours a day, seven days a week and provide inpatient medical treatment, including acute and long-term care.

Source: <https://www.usgbc.org/leed/v41#bdc>





The LEED v4.1 changes to the BD+C rating system include:

- Upgrade to ASHRAE 90.1-2016 2016 version ³⁶
- A new Renewable Energy credit ³⁷
- Restructured Materials and Resources credits
- Integration of credits tested and implemented through the Pilot Credit Library
- International standards added or updated
- Updated performance thresholds

The following sections detail the changes in the Materials and Resources credits as previously listed in Table 1.

MR Credit: Building Life-Cycle Impact Reduction (MRc1)

The MR Credit: Building Life-Cycle Impact Reduction (MRc1) is intended to reward the reuse of existing buildings and/or their components. Where building reuse is possible, Option 1 of this credit may be applied. The approaches to achieving the credit differentiate between reuse of structural elements (Option 1, Path 1) versus interior and nonstructural reuse (Option 1, Path 2). Through Path 1, up to 5 points are awarded for at least 75% reuse (by project area) of existing walls, floor, roofs, and envelope. Path 2 offers 1 point if there is at least 30% retention of the building (e.g. interior walls, doors, floor coverings and ceiling systems).³⁸

It is worth noting that this credit does not require an assessment of whether building reuse is the lowest environmental impact alternative. Although reuse is typically or often the best option from an environmental or carbon balance point of view, some studies have shown it is not always the case.³⁹ Given that the credit is intended to address life-cycle impacts, it may be appropriate to require an LCA for every project in future versions of LEED, including those proposing reuse of elements. This requirement may also contribute to the understanding of the quantifiable benefits of reuse as well as the scenarios where reuse is not the best alternative.

³⁶ This is the energy code for commercial buildings, see: <https://www.energy.gov/eere/buildings/articles/new-energy-code-commercial-buildings-standard-901-2016>

³⁷ The Renewable Energy credit emphasizes the value of onsite renewable energy production and includes narrowly defined allowable biofuel sources. In LEED v4.1, biofuels are only considered on-site renewable systems when the renewable source is harvested on site and used for on-site generation of electric or thermal energy. Additional restrictions are placed on the types of eligible feedstocks. Allowable forest biomass sources for on-site renewable energy include the following if harvested on-site: clean urban wood waste, invasive species, habitat restoration programs, clean industrial wood waste (pallets), and treetops left over from logging operations. Source: https://build.usgbc.org/bd+c_guide p.155

³⁸ LEED v4.1 BD+C, [page 95](#)

³⁹ Monsù Scolaro, Antonello, and Stefania De Medici. 2021. "Downcycling and Upcycling in Rehabilitation and Adaptive Reuse of Pre-Existing Buildings: Re-Designing Technological Performances in an Environmental Perspective" *Energies* 14, no. 21: 6863. <https://doi.org/10.3390/en14216863> ; Cooper, D.R. and Gutowski, T.G. 2017. The Environmental Impacts of Reuse: A Review. *Journal of Industrial Ecology*, 21: 38-56. <https://doi.org/10.1111/jiec.1238> ; Gensler Research Institute. 2022. Climate Action Through Design. <https://www.gensler.com/reuse-impact-by-design-2020>

In projects where building reuse is not a substantial possibility, including New Construction projects, Option 2 to achieve this credit requires conducting a whole building life cycle assessment (WBLCA) and 1-4 points may be achieved.⁴⁰ There are four Paths for this Credit's Option 2 as listed below with their associated point levels. The guidance from LEED also defines basic baseline building considerations (i.e., comparable size, function, etc).⁴¹

4 Pathways for Option 2 of the MRc1 Credit:

Path 1: Conduct a life cycle assessment of the project's structure and enclosure (1 point).

Path 2: Conduct a life cycle assessment of the project's structure and enclosure that demonstrates a minimum of 5% reduction, compared with a baseline building in at least three of the six impact categories listed below, one of which must be global warming potential (2 points).

Path 3: Conduct a life cycle assessment of the project's structure and enclosure that demonstrates a minimum of 10% reduction, compared with a baseline building, in at least three of the six impact categories listed below, one of which must be global warming potential (3 points).

Path 4: Meet requirements of Path 3 and incorporate reuse and/or salvage materials into the project's structure and enclosure for the proposed design. Demonstrate reductions compared with a baseline building of at least 20% reduction for global warming potential and demonstrate at least 10% reduction in two additional impact categories listed below (4 points).

In addition:

For Paths 2, 3 and 4 listed above, no impact category assessed as part of the life-cycle assessment may increase by more than 5% compared with the baseline building.

*Impact categories:*⁴²

- global warming potential (GWP) (greenhouse gases), in kg CO₂e;
- depletion of the stratospheric ozone layer, in kg CFC-11e;
- acidification of land and water sources, in moles H⁺ or kg SO₂e;
- eutrophication, in kg nitrogen eq or kg phosphate eq;
- formation of tropospheric ozone, in kg NO_x, kg O₃ eq, or kg ethene; and
- depletion of nonrenewable energy resources, in MJ using CML I depletion of fossil fuels in TRACI.

Source: LEED v4.1 BD+C, page 95

⁴⁰ Compared to 3 points for WBLCA in LEED v.4

⁴¹ Additional details: The baseline and proposed buildings must be of comparable size, function, orientation, and operating energy performance as defined in EA Prerequisite Minimum Energy Performance. The service life of the baseline and proposed buildings must be the same and at least 60 years to fully account for maintenance and replacement. Baseline assumptions must be based on standard design and material selection for the project location and building type. Use the same life-cycle assessment software tools and data sets to evaluate both the baseline building and the proposed building, and report all listed impact categories. Data sets must be compliant with ISO 14044. Source: LEED v4.1 BD+C, page 95

⁴² Note: the guidance for reporting of impact category results: Report impacts in units of "per square foot" or "per square meter", rounded to the nearest 10⁻⁴ for all six impact categories. This information and additional detailed guidance is available from LEED, https://build.usgbc.org/bd+c_guide_p.175

As compared to LEED v4, this approach to MRc1 allows for greater flexibility and improved likelihood of whole building LCAs (WBLCAs) being done since this provides at least 1 point. It has been reported that over 25% of all LEED-certified projects are now attempting this credit, a significant change from a few years ago, when it was less than 10%.⁴³ See the sidebar for definitions of impact categories referenced in LEED v4.1 as provided by the Environmental Protection Agency (EPA).

Although more projects are attempting MRc1, it is unclear that more than 1 point can be consistently achieved using mass timber. Reported experiences indicate that it is highly feasible to achieve a 20% reduction in GWP or more by using mass timber as the preferred building material, but meeting the requirement that other impact categories not increase by more than 5% is difficult. To some degree, the 5% threshold is arbitrary and penalizes materials that already have low levels of impact (i.e., 5% of a small number is a small number whereas 5% of a large number is a larger margin). There are also differences in the results from various LCA software options that are available and that utilize different methodologies and assumptions. A shift to utilizing mass timber can generate modeled increases in eutrophication potential, sometimes there are also increases in acidification potential and smog formation potential, and less frequently there are increases in ozone depletion potential. Given the inconsistency of these outcomes across different software and the prioritization of addressing GWP reductions, project teams may choose to settle for the 1 point for doing the WBLCA or they can take the approach of adjusting the baseline building to also utilize mass timber and then undertake other design adjustments to meet the requirements of the credit.

Although this approach of using mass timber for the baseline building in the LCA may work in a variety of situations, it misrepresents the innovation that is occurring in the construction sector and the significant difference in GWP and carbon benefit associated with choosing renewable and bio-based products such as wood and mass timber.⁴⁴ As USGBC continues to explore LEED v5, it may be appropriate to further investigate the requirements of this credit and the thresholds that are currently used that may be creating inconsistent outcomes for material choices.

EPA Terms and Definitions of LCA Impact Categories

Global warming potential (GWP) (greenhouse gases): Global warming potential (GWP) refers to the warming (relative to CO₂) that chemicals contribute to the “greenhouse effect” of rising temperature and climate change. by trapping the earth’s heat.

Depletion of the stratospheric ozone layer (ozone depletion potential): The stratospheric ozone layer filters out harmful ultraviolet radiation from the sun. Chemicals such as chlorofluorocarbons, if released to the atmosphere, may result in ozone destroying chemical reactions. Stratospheric ozone depletion refers to the release of chemicals that may contribute to this effect.

Acidification potential: The release of chemicals that may contribute to the formation of acid precipitation.

Eutrophication potential: Eutrophication (nutrient enrichment) impacts to water are based on the identity and concentrations of eutrophication chemicals released to surface water after treatment. Nitrogen (N) and phosphorus (P) are the two major limiting nutrients of importance to eutrophication.

Formation of tropospheric ozone (smog formation potential): Also called photochemical oxidant creation potential (POCP) or smog, this impact category refers to the release of chemicals that may contribute to photochemical oxidants being produced in the atmosphere from sunlight reacting with hydrocarbons and nitrogen oxides. At higher concentrations they may cause or aggravate health problems, plant toxicity, and deterioration of certain materials.

Depletion of nonrenewable energy resources: Nonrenewable resource impact scores are based on the amount of primary, ancillary, and fuel inputs of nonrenewable materials.

Source: EPA, 2015. Chapter 3 LIFE-CYCLE IMPACT ASSESSMENT
<https://www.epa.gov/sites/default/files/2015-04/documents/ch3.pdf>

⁴³ The 15 best LEED v4.1 credit substitutions for LEED BD+C by Kimiko Marinacci (Dec 2022)

⁴⁴ For additional discussion of WBLCA and mass timber, see the resources available from WoodWorks, here: [Introduction to Whole Building Life Cycle Assessment: The Basics - WoodWorks | Wood Products Council](#)

MR Credit: Environmental Product Declarations (MRc2)⁴⁵

This credit provides up to 2 points and incentivizes the use of products and sourcing from manufacturers who provide reports on life-cycle impacts. The credit has been simplified from v4 to recognize the types of product-specific LCAs and Environmental Product Declarations (EPDs) that are available in the marketplace and reduce the use of “partial weightings” (i.e., ½ product valuations). The cost thresholds have been removed so that the focus is on the number of products and manufacturers. This was the most substituted credit in LEED v4, and nearly 80% of projects achieved at least one point.⁴⁶

The most significant change in this credit is the recognition of more EPDs and LCAs. For LEED v4.1, industry-wide Type III EPDs including external verification are valued as one whole product (minimum 20 required to achieve credit under Option 1). The American Wood Council (AWC) and Canadian Wood Council (CWC) currently co-publish industry-average EPDs for a variety of wood products. A list of these, as well as manufacturer specific EPDs can also be found on the WoodWorks’ website.⁴⁷

There are two options for achieving this credit:

Option 1: Environmental Product Declaration

Use at least 20 different permanently installed products sourced from at least 5 different manufacturers. For Exemplary Performance: Source at least 40 qualifying products from five manufacturers.

Weighting:

- Product-specific Type III EPD = 1.5 product
- All other EPD/ critically reviewed LCA = 1 product⁴⁸

Option 2: Multi-Attribute Optimization

Use products that comply with one of the criteria below for 10%, by cost, of the total value of permanently installed products in the project, or use at least 10 permanently installed products sourced from at least 3 different manufacturers.

Category	Requirements	Weighting
Product specific LCA using EN 15804 or ISO 21930	Publicly available Life Cycle Impact Reduction Action Plan	Value at 50% by cost or ½ product
Current third-party EPD or verified LCA that conforms to the comparability requirements of ISO 14025 and ISO 21930	Demonstrate impact reduction in GWP, including a narrative how reductions were achieved. The published comparisons must be third-party verified	Value at 100% by cost or 1 product
	As above but minimum 10% reduction in GWP	Value at 150% by cost or 1,5 products
	As above but minimum 20% reduction in GWP and at least 5% reduction in 2 additional impact categories.	Value at 200% by cost or 2 products

Source: LEED v4.1 BD+C MRc2 Building Product Disclosure and Optimization (BDPO) - EPD credit (International & North America) (One Click LCA Help Centre, Accessed June 22, 2023.)

⁴⁵ This credit was named “Building Production Disclosure and Optimization Environmental Product Declarations” in LEED v4.

⁴⁶ [The 15 best LEED v4.1 credit substitutions for LEED BD+C](#) by Kimiko Marinacci (Dec 2022)

⁴⁷ <https://www.woodworks.org/resources/current-epds-for-wood-products/>

⁴⁸ Note: Industry-average EPDs are covered by LEED v4.1, for more information, see: <https://www.usgbc.org/credits/new-construction-core-and-shell-schools-new-construction-retail-new-construction-data-15?return=/credits/New%20Construction/v4.1/Material%20&%20resources>.



The credit also allows for local product sourcing (extracted, manufactured, and purchased within 100 miles) to be weighted by “Value at maximum 200% by cost or 2 products” for additional credit on-top of the LCA and EPD criteria.

The use of wood products under this credit is supported by the development of Product Category Rules (PCRs) and EPDS and the use of LCAs in the forest products sector. Many wood product manufacturers provide this information upon request or make it available to the public on their websites. There are also associations that provide the required information. Through association support and investment in research collaboration, industry-wide, ISO-compliant EPDs are available. In LEED v4, this type of EPD counted as only ½ product for purposes of credit achievement which made it difficult to achieve this credit. With the changes to LEED v4.1 all credible EPDs are recognized and can contribute to the credit.⁴⁹

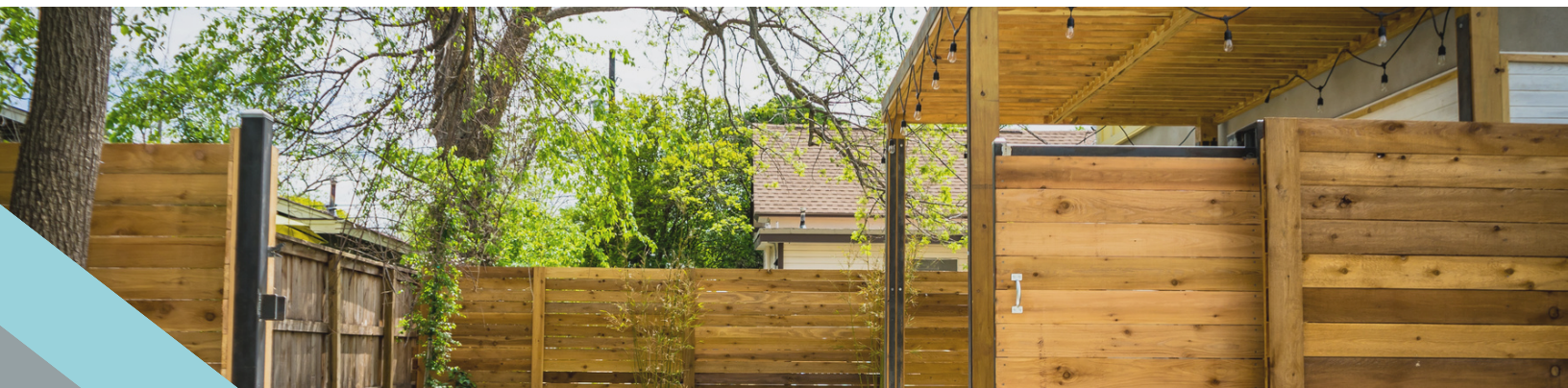
Sources of Forest Product EPDs
American Wood Council : [EPDs and Transparency Briefs](#)
The Canadian Wood Council: [EPDs](#)
WoodWorks: [Current EPDs for Wood Products](#)

Also see: [PCRs & EPDs - Environmental Product Declarations - Certification](#)

For diversified forest products companies that may be operating as small, local businesses it can be cost prohibitive to develop product-specific EPDs for their individual operations. Also building projects often source lumber and other wood products from multiple different mills and manufacturers, reducing the useability of a mill-specific EPD. The collaborative and scientifically-rigorous approach undertaken through associations is an important innovation to ensure small and large producers can access green building product markets.

To maintain wood product eligibility under the MRc2 credit in LEED v4.1, manufacturers will need to continue to provide the requested information, address additional products with EPDs, and update the assessments and associated reporting as necessary to stay current. The forest products industry has been an early adopter of EPDs and can continue to lead and innovate in this area of environmental accountability.

⁴⁹ For additional discussion of WBLCA and mass timber, see the resources available from WoodWorks, here: [Introduction to Whole Building Life Cycle Assessment: The Basics - WoodWorks | Wood Products Council](#)



MR Credit: Sourcing of Raw Materials (MRc3)⁵⁰

This credit provides up to 2 points and rewards the selection of products that are verified to have been extracted and sourced responsibly. The changes from v4 are significant in that one option has been removed and shifted to the Pilot Credit Library for further refining and updating⁵¹. There is one remaining option for this credit and the thresholds and limitations have been changed to make it more accessible – down from 20% to 15% for 1 point and from 40% to 30% for 2 points. However, because the credit continues to include five different criteria (see listing below) for defining responsible sourcing and a variety of thresholds and valuations (ranging from 50% to 200%), achieving this credit creates a bit of a game and the marketplace has identified the most efficient ways to work the numbers.

5 Criteria for LEED v4.1 Sourcing of Raw Materials

- Extended Producer Responsibility (valued at 50% by cost)
- Biobased Products (valued at 50% by cost)
- Wood Products (valued at 100% by cost)
- Material Reuse (valued at 200% by cost)
- Recycled Content (valued at 100% by cost)

Note: For credit achievement calculation, products meeting the above criteria and sourced (extracted, manufactured and purchased) within 100 miles (160 km) of the project site are eligible for greater recognition and are valued at twice their base contributing cost, up to a maximum of 200% of cost.

Source: LEED v4.1 BD+C guide pp186-187

A survey of more than a dozen projects representing over \$300 million in material costs found that 85% of the products contributing to achieving this credit were associated with the Recycled Content criteria. The Wood Products criteria (FSC or USGBC-approved equivalent-certified wood) accounted for 7%; Extended Producer Responsibility (EPR) was less than 0.5%, Material Reuse was reported once, and Biobased wasn't reported for any project materials.⁵² Wood products that typically qualify under the recycled content criteria include particleboard, fiberboard, and finger-jointed studs. Recycled content is calculated as the sum of post-consumer recycled content plus one-half the pre-consumer recycled content, based on weight.⁵³

The criteria for wood products in this credit is written the same as in LEED v4:

Wood products. *Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation.*

⁵⁰ This credit was named "Building Product Disclosure and Optimization Sourcing of Raw Materials" LEED v4.

⁵¹ Option 1 for this credit in LEED v4 referenced the utilization of Corporate Social Responsibility (CSR) reports as a mechanism for determining responsible sourcing. However, these reports are not standardized and provide inconsistent information about material sourcing. Additionally, although CSR reporting has become an increasingly common practice for large multinational corporations these reports are not generally available for other business types, including small, local businesses. In 2018, it was reported that Option 1 for this credit had never been achieved (Source: [LEED Version 4.1: Biggest Story at Greenbuild 2017](#), Accessed June 23, 2023.)

⁵² Linstroth, T. 2021. [MRc3 Sourcing of Raw Materials in LEED v4.1](#) Note: For purposes of this credit, biobased does not include wood products.

⁵³ For further details see: [Sourcing of Raw Materials LEED v4.1](#)

Because the language continues to read “FSC or USGBC-approved equivalent” confusion remains in the marketplace about which forest certification programs or other systems of sourcing verification are eligible (i.e., what is an USGBC-approved equivalent?).⁵⁴ With LEED v4.1, USGBC has indicated that the Legal Wood pilot credit is an alternative compliance path for this credit.”⁵⁵ The Legal Wood pilot credit is reproduced below.

Pilot Alternative Compliance Path – Legal Wood

- *Wood products from Certified Sources as defined by ASTM D7612-10⁵⁶ are valued at 100% of their cost for purposes of credit achievement calculation if the following two conditions are also met:*
 - *100% of all wood is verified to be from Legal (non-controversial) Sources as defined by ASTM D7612-10. These components include at a minimum, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.*
 - *And 70% (based on cost) of all wood used on the project is from Responsible Sources as defined by ASTM D7612-10. These components include, at a minimum, structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.*

Source: Legal Wood | U.S. Green Building Council (USGBC, Last updated 5/5/21; Accessed June 22, 2023)

This pilot credit has been in place since 2016 and has included the recognition of wood and paper products certified to the Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), Sustainable Forestry Initiative (SFI), American Tree Farm System (ATFS), and Canadian Standards Association (CSA) standards.⁵⁷ In general, for the Legal Wood ACP credit at least 30% of the wood needs to be Chain-of-Custody certified and other supply chain assurances can contribute to the remainder (e.g., SFI Fiber Sourcing). There is a “Legal Wood Pilot ACP Calculator” (an Excel spreadsheet) available from USGBC that can aid in the process.⁵⁸ Also, there is now an online resource for classifying sources of wood fiber in alignment with the ASTM D7612-21 standard that can aid in understanding what is legal (non-controversial) and responsible.⁵⁹

Related to this credit is the continued expansion of the availability of reused wood products ranging from lumber to consumer goods and architectural elements. The North America's Wood Reuse & Recycling Directory aids in identifying available products by location or product type and offers information about alternatives for end-of-life outcomes for wood from construction to support greater material recovery and improved circularity.⁶⁰

54 For additional information and clarification, see: Earning LEED points with certified wood <https://www.usgbc.org/articles/earning-leed-points-certified-wood> (A.Perkins, 2019). Also see: How to Count your Certified Products for a LEED Point (SFI, 2020) https://forests.org/wp-content/uploads/SFI_Wood_LEED_ACP.pdf

55 [Legal Wood | U.S. Green Building Council](#) (USGBC, Last updated 5/5/21; Accessed June 22, 2023)

56 [ASTM D7612-10 Standard Practice in Categorizing Wood and Wood-Based Products according to their Fiber Sources](#) (Accessed June 23, 2023)

57 [SFI now allowed?? | LEEDuser](#) (LEEDuser, 2016); [USGBC Announces New Pathway to Encourage Environmentally Responsible Forest Management in LEED](#) (PRNewswire, 2016)

58 [Legal Wood Pilot ACP Calculator](#) (USGBC) <https://www.usgbc.org/resources/legal-wood-pilot-acp-calculator>

59 [Wood Sourcing Tool](#) (Accessed June 23, 2023) Note: This tool is educational and does not provide the documentation needed for LEED credits.

60 <https://reusewood.org/>



MR Credit: Material Ingredients (MRc4)⁶¹

The intention of this credit (up to 2 points) is to reward the use of products with disclosed chemical ingredients and verified minimization of harmful content.⁶² In 2018, the Sustainable Investment Group (SIG) reported that for v4 *“this credit was only achieved by 17% of projects (the lowest rate of achievement for any credit) and it will require serious reconsideration for the whole credit of material ingredients.”*⁶³ This was also the third most substituted credit for LEED v4 projects adopting 4.1 alternatives.⁶⁴

In general, the changes to this credit in v4.1 focus on making the thresholds less burdensome. For example, for Option 1, the credit now requires 10 products instead of 20 when it is a Core and Shell (BD+CC&S) or Warehouse project. Option 2 for this credit now requires 5 permanently installed products from at least 3 manufacturers, rather than a 25% of costs threshold. Option 3 has been moved to the Pilot Credit Library for further consideration.

The recognized methods for verifying chemical ingredients for this credit include ANSI/BIFMA e3 Furniture Sustainability Standard, Material Health Certificate, Cradle to Cradle Certified™, Declare labels, NSF/ANSI 336: Sustainability Assessment for Commercial Furnishings Fabric, Global Green TAG, Health Product Declaration, Living Product Challenge, or a published manufacturer inventory. For each of these methods, additional guidance is provided for the threshold or specific level that must be achieved. The addition to this section is that products with compliant reports, and third-party verification that includes the verification of content inventory, are now worth 1.5 products.⁶⁵ As in the prior standard, if local products are used, they are eligible for greater recognition. Products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing number of products, up to a maximum of 2 products.⁶⁶

⁶¹ This credit was named “MR Credit: Building Production Disclosure and Optimization Material Ingredients (MRc4)” in LEED v4. The language of the LEED v4 credit is available here: [Building product disclosure and optimization - material ingredients](#) (Accessed June 23, 2023).

⁶² [LEED v4.1 BD+C, page 99](#)

⁶³ [LEED Version 4.1: Biggest Story at Greenbuild 2017](#), Accessed June 23, 2023.

⁶⁴ [The 15 best LEED v4.1 credit substitutions for LEED BD+C by Kimiko Marinacci](#) (Dec 2022)

⁶⁵ The full language of this credit is available here: [Material Ingredients | U.S. Green Building Council](#) (v4.1) Accessed June 23, 2023)

⁶⁶ [LEED v4.1 BD+C, page 101](#)





MR Credit: Construction and Demolition Waste Management (MRc5)

This credit includes waste prevention (primarily through planning) and waste diversion. The Option 1 threshold is still 50% diversion (1 point), but the minimum of three waste streams has been removed. Option 2 now has two thresholds (1 or 2 points) and they are both considered more achievable than the LEED v4 approach.⁶⁷ With Option 2, points are awarded for diverting at least 50% of all renovation and demolition waste, and/or generating less than 10 lbs/ft² (50 kg/m²) of waste materials from all new construction activities.⁶⁸ As with LEED v4, the credit rewards diversion from both landfills and incineration facilities; however, the guidance allows for diversion of wood for fuel use. As noted in the guide, “The combustion of wood materials resulting from recycling processing (also known as wood-derived fuel or biomass [for energy]) is classified as an acceptable means of diversion for projects both in the U.S. and internationally.”⁶⁹

Consideration of Changes to Credits related to Indoor Environmental Quality

As listed in Table 1., the USGBC indicates major changes made to these credits related to Indoor Environmental Quality:

- EQp Minimum Indoor Air Quality
- EQc Low-Emitting Materials
- EQc Indoor Air Quality Assessment
- EQc Acoustic Performance

The changes with relevance to wood products are within EQc Low Emitting Materials. As in LEED v4, wood products are referenced in this credit which addresses the use of composite wood products as well as flooring, wall panels, and furniture. The requirements for these products include addressing VOC emissions and content.⁷⁰ The lists of included product categories have been modified from v4 to v4.1. For example, some of the additions to the wall panel products that must be included in the evaluation for this credit include “countertops, laminate/veneer used for built-in cabinetry, [and] non-structural sandwich panels”. Similarly, the furniture product category has the addition of “systems furniture workspaces, moveable/demountable partitions, bathroom/toilet partitions, shelving, lockers, specialty and custom fixtures and furniture, and furnishing items (such as area rugs, cubicle curtains, mattresses, and mirrors).”

⁶⁷ The 15 best LEED v4.1 credit substitutions for LEED BD+C by [Kimiko Marinacci](#) (Dec 2022)

<https://www.usgbc.org/articles/15-best-leed-v41-credit-substitutions-leed-bdc>

⁶⁸ LEED v4.1 BD+C, page 108 and

⁶⁹ LEED v4.1 BD+C guide, page 215

⁷⁰ Volatile Organic Compounds (VOCs), for additional information see: [What are volatile organic compounds \(VOCs\)? | U.S. EPA](#)

As in LEED v4, untreated and unfinished wood flooring is classified as an inherently non-emitting source, and this credit does not generally apply to structural wood products.

Additional Changes in LEED v4.1

While this report is focused on the changes most directly impacting wood products, it is also worth noting that in LEED v4.1 there have been new efforts to address social sustainability and human impacts of the built environment more directly than in past versions. These efforts are reflected in the guidance, specific credits, and pilot credits that consider social equity outcomes and alignment with human health and wellness objectives.^{71, 72} The LEED v4 standard had established a credit for a “High Priority Site” that addresses historic, brownfield, and federally identified investment zones.⁷³ The LEED v4.1 standard has renamed this credit to “High Priority Site and Equitable Development” and it includes economically disadvantaged community locations (based on census tracts) and affordable housing thresholds for residential and mixed-use projects of up to 10% for rental units (at least 1 unit) and priced at 60% of Area Median Income (AMI)⁷⁴ (the threshold for for-sale units is 5% and 80% of AMI).⁷⁵

The Bottom Line

Overall, the changes from LEED v4 to LEED v4.1 may result in credits that are easier to achieve and more in alignment with what is available in the marketplace, but the overall opportunity for wood products to contribute to a LEED project remains about the same with an estimated 10 to 12 points being related to wood product choices.⁷⁶

Recognizing that LEED v4.1 was first made available for project registrations in 2018, it is understandable that it doesn't reflect the developments that have occurred in the past five years in relation to innovative wood products and the growing understanding of the multiple benefits of wood as a construction material. Recent research has added to the understanding that bio-based materials provide unique opportunities to mitigate climate change, enhance forest health and resiliency, contribute to managing wildlife risks and impacts, and many other ecological, economic, and social benefits. In terms of climate benefits of wood construction, research published in April 2023 concluded that the estimated total carbon impact of the evaluated mass timber projects, including avoided emissions and carbon storage in wood, averaged 0.38 tCO₂e/m² of floor space, representing carbon values ranging into the millions of dollars.⁷⁷ This carbon benefit is comparable to avoiding the emissions of a barrel of oil for every square meter of mass timber construction.⁷⁸

71 [Updates to LEED v4.1 credit language emphasize social equity | U.S. Green Building Council](#) (USGBC, 2021. Accessed June 23, 2023).

72 [LEED Link: LEED v4.1 credit categories | U.S. Green Building Council](#) (USGBC, 2021. Accessed June 23, 2023).

73 [High priority site | U.S. Green Building Council \(v4\)](#) (Accessed June 23, 2023).

74 Area Median Income (AMI), for more information: [AMI and Housing Affordability](#) (Metropolitan Council, 2018. Accessed June 23, 2023).

75 [High Priority Site and Equitable Development, v4.1](#) (Accessed June 23, 2023).

76 This estimate of wood related points is discussed in greater detail in the 2014 report.

77 Taylor A, Gu H, Nepal P, Bergman R. 2023. Carbon credits for mass timber construction. *Business BioProducts Business* 8(1), 2023, pp. 1–12. <https://doi.org/10.22382/bpb-2023-001>

78 One barrel of oil is equivalent to an estimated 0.43 metric tons of CO₂ emissions ([EPA, 2023](#)).

The benefits of wood as a construction material apply to a wide range of products, and in recent years the potential has been highlighted in mass timber having expanded from a niche innovation to recognition within building codes adopted, in whole or in part, in at least 24 U.S. states.⁷⁹ There are also continued advancements in responsible sourcing, such as the Wood Sourcing Tool,⁸⁰ and the availability of reclaimed wood products that contribute to greater circularity.⁸¹ At the same time, there are advancements in wood energy and wood products, such as biochar, as decarbonization strategies for heavy industry and for advancing the technologies of carbon capture and storage.⁸² All of these developments are occurring within the context of responsible forest management to ensure sustainability while maintaining, restoring, and enhancing a full spectrum of forest products and services for people and the planet.⁸³ The benefits of wood construction in general have been consistently under-recognized within LEED and should be better addressed in LEED v5 for a full range of forest products, including mass timber.

There continues to be increased incorporation of green building concepts into buildings of all kinds. Innovation is occurring through voluntary green building programs such as LEED as well as building code changes and procurement policies. Buildings constructed now and in the future will continue to be significantly more energy efficient than those of past generations, and more attention will be given to minimizing environmental impacts wherever possible using increasingly sophisticated science-based tools to identify lowest impact alternatives. In this environment, wood can be the building material of choice, especially if the wood products industry continues to ensure sustainability and provide the information requested by green building project developers.

As USGBC continues to work on LEED v5, it will be important to recognize the recent developments as well as long-known benefits of wood and potentially consider a whole new approach to providing credit for the choice of wood as a preferred material for demonstrating leadership in environmental design.

⁷⁹ As of August 2023, for the most current information, see: [Status of Building Code Allowances for Tall Mass Timber in the IBC - WoodWorks | Wood Products Council](#)

⁸⁰ [How can I tell if wood is sustainably sourced?](#) (Wood Sourcing Tool, Accessed June 23, 2023).

⁸¹ [ReuseWood - Business Directory and Guide](#)

⁸² For further discussion of these opportunities, see: [Carbon Capture Technologies and Natural Climate Solutions: 1+1 = 3](#) (Dovetail Partners, 2023)

⁸³ For further discussion of forest sustainability within the context of growing wood product demand, see: [Special Issue : Mass Timber and Sustainable Building Construction](#) (A special issue of *Sustainability* (ISSN 2071-1050), 2022)



Resources:

LEED v4.1 Webpage: <https://www.usgbc.org/leed/v41>

LEED v4.1 BD+C Guide: https://build.usgbc.org/bd+c_guide

LEED v4.1 BD+C Standard: <https://build.usgbc.org/bdc41>

LEED v4 to LEED v4.1 Credit Changes (BD+C):

<https://www.usgbc.org/sites/default/files/CreditMappingBDC.pdf>

Understanding the Changes: LEED 2009 to LEED v4.1

Available at: <https://www.usgbc.org/articles/understanding-changes-leed-2009-leed-v41>

(Recorded webinar about the changes is also available at this link)

Direct download: https://build.usgbc.org/Understanding_the_changes_LEED_2009_to_LEED_v4.1?utm_source=usgbc-website&utm_medium=article&utm_campaign=leed-v4-1

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