

TAKING THE LEED: HOW GREEN BUILDINGS CAN SUPPORT CLIMATE MITIGATION

LEED Certification Supporting Climate Goals

Climate change is among the biggest challenges of our time, affecting virtually every aspect of life as we know it. The impacts will not be even-handed, implicating concerns over equity and survival for the poorest and least resilient communities.

The good news? There are many solutions available today. Green buildings, like those that are LEED certified, are a global solution for cities, communities and neighborhoods. In fact, LEED buildings deliver greenhouse gas (GHGs) reductions by reducing energy and water consumption, reduced waste generation, using more durable, lower impact materials, and encouraging alternative transportation.

BUILDINGS' ROLE IN CLIMATE CHANGE

According to the International Energy Agency, buildings were responsible for 28% of global energy-related CO₂ emissions in 2019, or 10 GtCO₂. Buildings and construction together account for nearly 40% of energy-related carbon emissions.¹ How we build and operate our buildings will have a direct impact on our carbon footprint for decades.

Building-related GHGs result from onsite consumption of fossil fuel for heating and cooling; fossil fuel-based electricity; carbon from energy used to pump and treat water; employee or resident transportation; hauling and disposal of waste; and more.

Quantifying greenhouse gas reduction benefits of LEED buildings

A [study](#) done by the University of California at Berkeley for the California Air Resources Board quantified the GHG reductions from non-energy categories for LEED-certified existing buildings in California.

The study found the LEED certified buildings were associated with:

- 50% less GHGs from water use
- 48% less GHGs from solid waste
- 5% less GHGs from transportation

HOW DO LEED BUILDINGS PERFORM? THE DATA TELL THE STORY

LEED has the power to achieve high levels of project performance and lower resulting GHG emissions. The best way to apply LEED to achieve climate mitigation is twofold: (1) set clear energy and carbon intensity or net zero targets, and (2) aim for LEED Platinum or Gold certification.

As illustrated in the chart on the next page, LEED Platinum buildings reported lower Scope 1 and 2 GHG emissions per unit floor area and per Full-Time Equivalent (FTE) occupant than projects achieving lower levels of LEED certification.²

¹ [Global Status Report for Buildings and Construction 2019](#), International Energy Agency.

² [Arc Impact, Key Performance Indicators](#), Arcskoru (2022).

Table 1 GHG Intensity of LEED Buildings in Arc

LEED Certification Level	GHG Emissions by Floor Area (kgCO2e per sqft/year)	GHG Emissions by Occupant (kgCO2e per sqft/year)
Certified	5	3,473
Silver	5	3,894
Gold	4	2,834
Platinum	3	1,380

THE LEED SYSTEM HELPS REDUCE BUILDING GHG EMISSIONS

LEED certified buildings contribute to climate mitigation in several key ways:

1. **Use Less Energy and Water:** Green buildings are designed to use less water, less energy and fewer resources. By using energy more efficiently, building projects reduce total energy consumption, as well as to reduce use of fossil fuel or move away from onsite fuels towards clean sources of electricity. Energy efficiency is a critical strategy to reduce peak and total needs and sets the stage for effective on-site renewable energy. LEED also features a path focused on the GridOptimal metrics, developed with NBI, to quantify a building's performance as a grid asset through reduced and flexible demand. LEED rewards reductions in water use and the associated embodied carbon used to produce, move, and treat that water.
2. **Consider Lifecycle Impacts:** LEED buildings are designed and built in consideration of lifecycle impacts – in other words, the environmental impacts for products, processes, and systems. LEED rating systems incorporate LCA concepts in credits related to water use, energy use, greenhouse gasses, ozone depletion, and materials.
3. **Support Occupant Behavior:** LEED buildings provide mechanisms to actively influence inhabitants in ways that support

the climate. LEED supports communicating with, enabling, and empowering building occupants to help meet the sustainability goals for the building. For example, LEED buildings can create opportunities for more composting and reduced landfill waste; alternative transportation; and non-energy-using alternatives.

4. **Shrink Carbon Footprint:** LEED rewards thoughtful decisions about building location with credits that encourage connection with transit and amenities, as well as retention and creation of natural vegetated land areas and roofs. These strategies create opportunities to significantly reduce the carbon footprint beyond energy efficiency alone

According to a June 2018 [assessment by the US General Services Administration](#), its portfolio of high-performing buildings – many of them LEED certified – used 23% less energy, 28% less water, and generated 9% less landfill waste compared to GSA's legacy stock buildings. Each of these resources has associated GHG emissions, so reducing their use can shrink building's total operational GHG footprint.

CLIMATE CHANGE MITIGATION IS A KEY GOAL FOR LEED

One of the key goals that guided the [development](#) of LEED v4 was mitigating a building's contribution to climate change. The outcome was a rating system where 35 percent of the LEED weighting process goes to climate change mitigation.

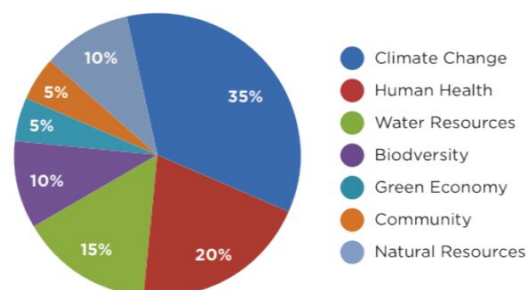


Figure 1: Weighting of the LEED v4 Impact Categories to account for differences in scale, scope, severity, and relative contribution of the built environment to the impact.

LEED continues to evolve to address climate change and our understanding of building

performance. [LEED v4.1](#) includes the [Optimize Energy Performance](#) credit with two metrics: energy cost and GHG reduction. A potential of 18 points may be awarded, based on the sum of points for each metric. LEED v4.1 also updates the credit for [Renewable Energy](#), adding additional procurement strategies and reflecting stacking performance mechanisms. This credit was the result of the consolidation of two previous LEED v4 credits – Carbon Offsets and Renewable Energy Production into a single credit.

LEED credit categories address topics such as reduction in energy use, connection with public transportation, and the embodied energy associated with materials and water use.

BUILDING OPERATIONS ENERGY USE

Credits in the [Energy & Atmosphere](#) LEED category mitigate the effect of a building's carbon emissions by directly reducing energy use from systems that rely on carbon-based energy sources and awarding the use of low carbon energy sources.

LEED also targets the reduction of potent GHGs associated with refrigerants, which have been identified as one of the top strategies for reducing GHG emissions. A prerequisite for all LEED projects, [Fundamental Refrigerant Management](#), focuses on reducing leaks, while the credit, [Enhanced Refrigerant Management](#), rewards the usage of more efficient and less harmful refrigerants, while preventing leakage and ozone depletion through fugitive emissions

TRANSPORTATION ENERGY USE

Credits in the [Location and Transportation](#) LEED category enable new buildings to improve land use patterns and position occupants to take advantage of public transportation and alternative forms of transport, which contributes to a reduction of GHG emissions from single-passenger vehicles.



Figure 2: LEED's Location & Transportation credits encourage incorporation of infrastructure elements that provide environmental and human health benefits, like public transportation and bicycling.

MATERIALS - EMBODIED ENERGY USE

[Material & Resources](#) LEED credits address a building's embodied carbon. This includes targeting the energy use and processes required in the extraction, production, transportation, manufacturing, distribution, and disposal of materials and products used throughout the entire lifecycle of a building.

WATER - EMBODIED ENERGY USE

[Water Efficiency](#) LEED credits address the significant use of energy related to the treatment, processing, and distribution of water. Efficiencies that reduce the use of potable or non-potable water will indirectly reduce energy use and help mitigate GHG emissions.

GREEN INFRASTRUCTURE AND SITING

[Sustainable Sites](#) LEED credits focus on the non-energy related drivers of climate change including land use changes, heat island effect, and pollution through solutions such as green infrastructure and purposeful decisions on building location and siting.

PILOT CREDITS OFFER BIG IMPACT

The use of LEED pilot credits can be an effective strategy in climate mitigation. For example, some of the Materials and Resources pilot credits touch on sourcing materials as carbon reduction strategies, including the use of [low carbon construction materials](#), [the integrated analysis of building materials](#), and the selection of [products that support the circular economy](#).

The [Circular Economy](#) pilot credit rewards project teams for selecting products that are manufactured with zero waste, designed to be cycled multiple times, and are recovered at the end of their life to be resourced. Together, these materials strategies allow for a more comprehensive assessment of a building's impact on climate – and opportunities to reduce it.

In 2019, the Carbon Leadership Forum (CLF) debuted its [Embodied Carbon in Construction Calculator](#), or EC3. This software tool allows project teams to benchmark, assess, and reduce embodied carbon, with a focus on the upfront supply chain emissions of construction materials. LEED v4.1 offers a credit to projects that reduce the embodied carbon of materials used in construction, and EC3 is referenced as a tool to support these efforts. The Procurement of Low Carbon Materials credit requires 1) calculation of a building's embodied carbon intensity, 2) utilization of lower embodied carbon materials in a project's construction, and 3) verification of a reduction in the project's embodied carbon intensity.

LEED's Sustainable Sites category also has several pilot credits that relate to climate. One SS credit rewards the [assessment and maximization of onsite carbon sequestration through plantings](#), and another is available to projects that [minimize the health and climate impacts associated with construction activities](#).

These and other pilot credits can support up to five additional points for a particular project and they can have great impact on a project's climate mitigation.



Figure 3: LEED encourages sustainable strategies to combat the heat island effect like green roofs.

LEED ZERO IS THE NEXT LEVEL OF BUILDING SUSTAINABILITY

LEED projects achieving the highest level of sustainability can now obtain an additional certification recognition [LEED Zero](#), a complement to LEED that verifies the achievement of net zero goals in existing buildings.

- LEED Zero Carbon recognizes net zero carbon emissions from energy consumption through carbon emissions avoided or offset over a period of 12 months.
- LEED Zero Energy recognizes a source energy use balance of zero over a period of 12 months.
- LEED Zero Water recognizes a potable water use balance of zero over a period of 12 months.
- LEED Zero Waste recognizes buildings that achieve GBCI's TRUE certification at the Platinum level.

In 2020, Washington, DC became the first jurisdiction to reference LEED Zero in its building code. The [2017 DC Construction Code](#) established a new, alternative pathway for net zero commercial and residential buildings, including LEED Zero Energy and LEED Zero Carbon. For a complete list of LEED Zero projects, see the [project directory](#). For more on LEED Zero, check out [these net zero resources](#) and the [LEED Zero slide deck](#). For more information on other policy topics, [contact us](#).