WELCOME MESSAGE FROM THE PRESIDENT

It is our pleasure to welcome you to the fifth edition of the Green Building Initiative's (GBI's) Green Globes Professional (GGP) certification program. This training is intended to develop experienced sustainability professionals into expert users of the Green Globes building assessment and rating system. GBI recognizes your time is valuable and seeks to provide you with a detailed yet focused training program that is self-paced and can be completed efficiently. The GGP credential demonstrates that you are a leader in the green building movement and on the cutting edge of the latest green building trends and technologies.

The goal of GBI is to ensure that all commercial buildings—regardless of size, type, or budget—are built and managed in a resource-efficient, healthy, resilient, and environmentally sustainable manner. Buildings use an inordinate amount of resources and are responsible for nearly half of all energy consumption and greenhouse gas emissions in the U.S. One way to address this problem is to ensure that practical and affordable green building tools and technologies are available for mainstream use. As you will learn during your training, Green Globes' user-friendly and interactive approach makes it possible for any commercial building—from a school to a hospital, office building, warehouse, or grocery store—to be built and managed sustainably and achieve a highly credible green building certification.

Thank you for your commitment to improving the built environment. Good luck with your training, and we look forward to your involvement in GBI's community as a professional and/or organizational member.

Sincerely,

Vicki L. Worden

Vicki Worden
President & CEO
Green Building Initiative

SESSION 1

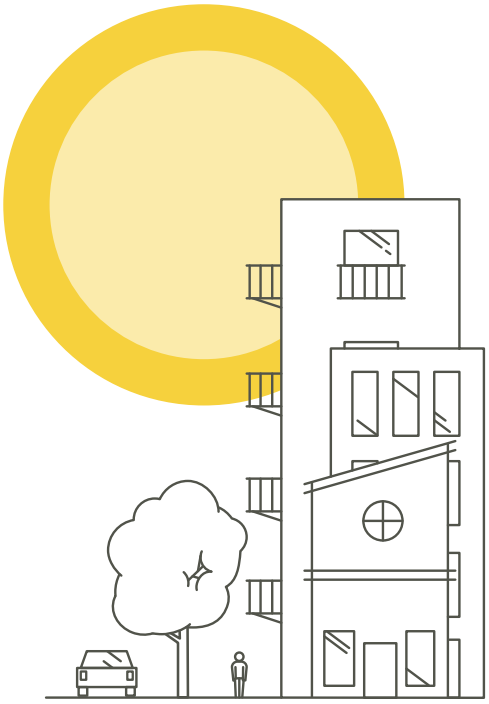
IMPORTANCE OF SUSTAINABLE BUILDINGS

LEARNING OBJECTIVES

- Understand the impacts of the built environment
- Explore solutions to the problems created by construction and the built environment
- Recognize the benefits of third-party assessment and certification

BUILT ENVIRONMENT IMPACTS

The global buildings sector is growing at unprecedented rates, and it will continue to do so. Over the next 40 years the world is expected to build nearly 2.5 trillion square feet in new construction, adding the equivalent of Paris to the planet every single week. Based on projections and construction trends, emissions from the building sector could double by 2050 if measures are not taken to reduce the impact of the building sector.



By 2050, the United Nations predicts the number of people on our planet will grow from about **7.6 billion** today to nearly **10 billion**. Those 10 billion people won't spread themselves evenly across our urban, suburban, and rural areas. Urban areas, which now welcome about 55% of the global population, will contain **68%** of the population by **2050**. 1.5 million people will be added to cities every week. In the USA, Between 2018 and 2050, it is expected that an average of 820 multifamily housing units will be constructed per day and that there will be a need to construct more than 300 non-residential buildings daily, on average, to keep up with demand.

Abergel, Thibaut, et al. Global Status Report 2017. UN Environment, 2017.

Statista / Autodesk. (2018) Building the Future, Keeping Up With Urban Population Growth White Paper. Statista / Autodesk, 24 August, 2018, https://damassets.autodesk.net/content/dam/autodesk/www/solutions/architecture-engineering-construction/docs/20190322_Autodesk_Whitepaper.pdf.

BUILDING CONSTRUCTION PROJECTS CONTRIBUTE TO **40%** OF LANDFILL WASTE [1]

CITIES EMIT **70%** OF THE WORLD'S CARBON DIOXIDE [3]

THEY ALSO USE **25%** OF GLOBAL WATER

40% OF GLOBAL ENERGY [2]

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[1] Global Status Report 2017. UN Environment. https://www.worldgbc.org/sites/default/files/UNEP%20188_GABC_en%20%28web%29.pdf

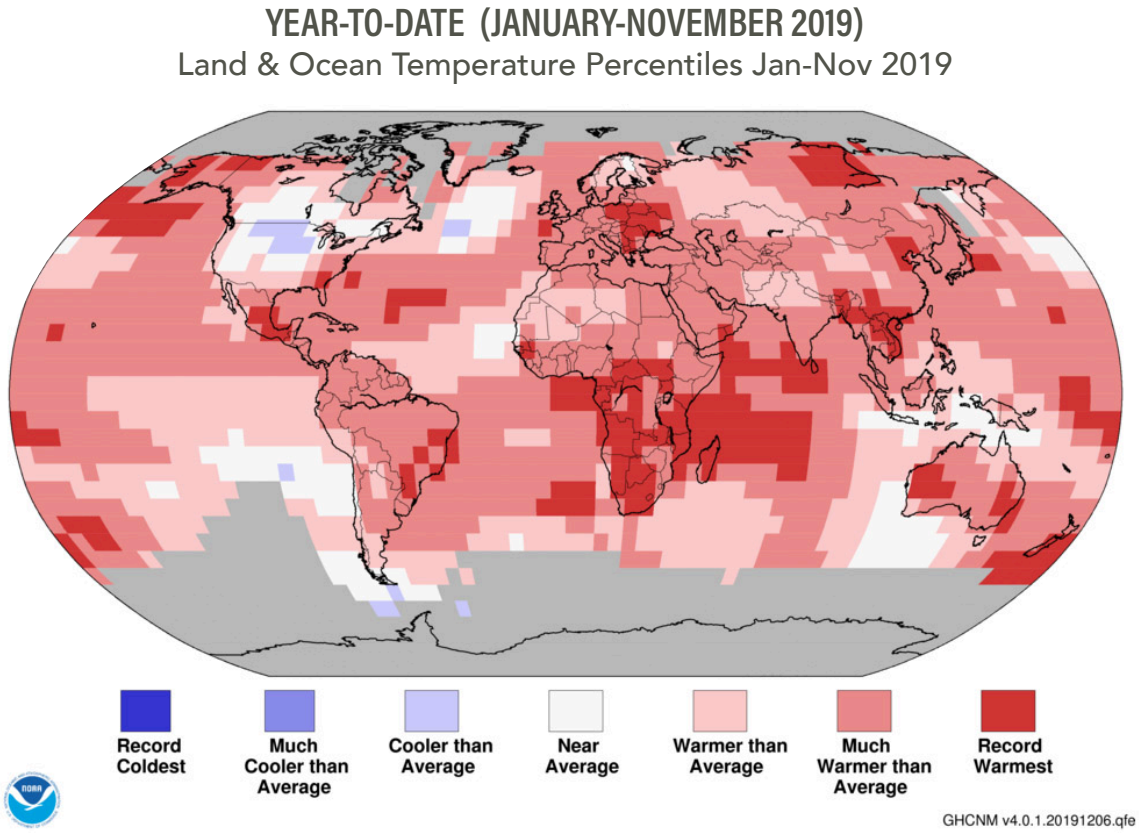
[2] Energy Information Administration (2008). Assumptions to the Annual Energy Outlook.

[3] Lenssen and Roodman (1995). Worldwatch Paper 124: A Building Revolution: How Ecology and Health Concerns are Transforming Construction. Worldwatch Institute.

[4] McGraw Hill Construction (2010). Smart Market Reports. Green BIM – How Building Information Modeling is Contributing to Green Design and Construction.

[5] http://www.globalchange.gov/browse/multimedia/observed-us-temperature-change

The impact that the building sector has on our environment is well known and documented. Our climate is changing, necessitating the adoption of building practices that result in resource efficient, healthier, resilient, and environmentally sustainable buildings.

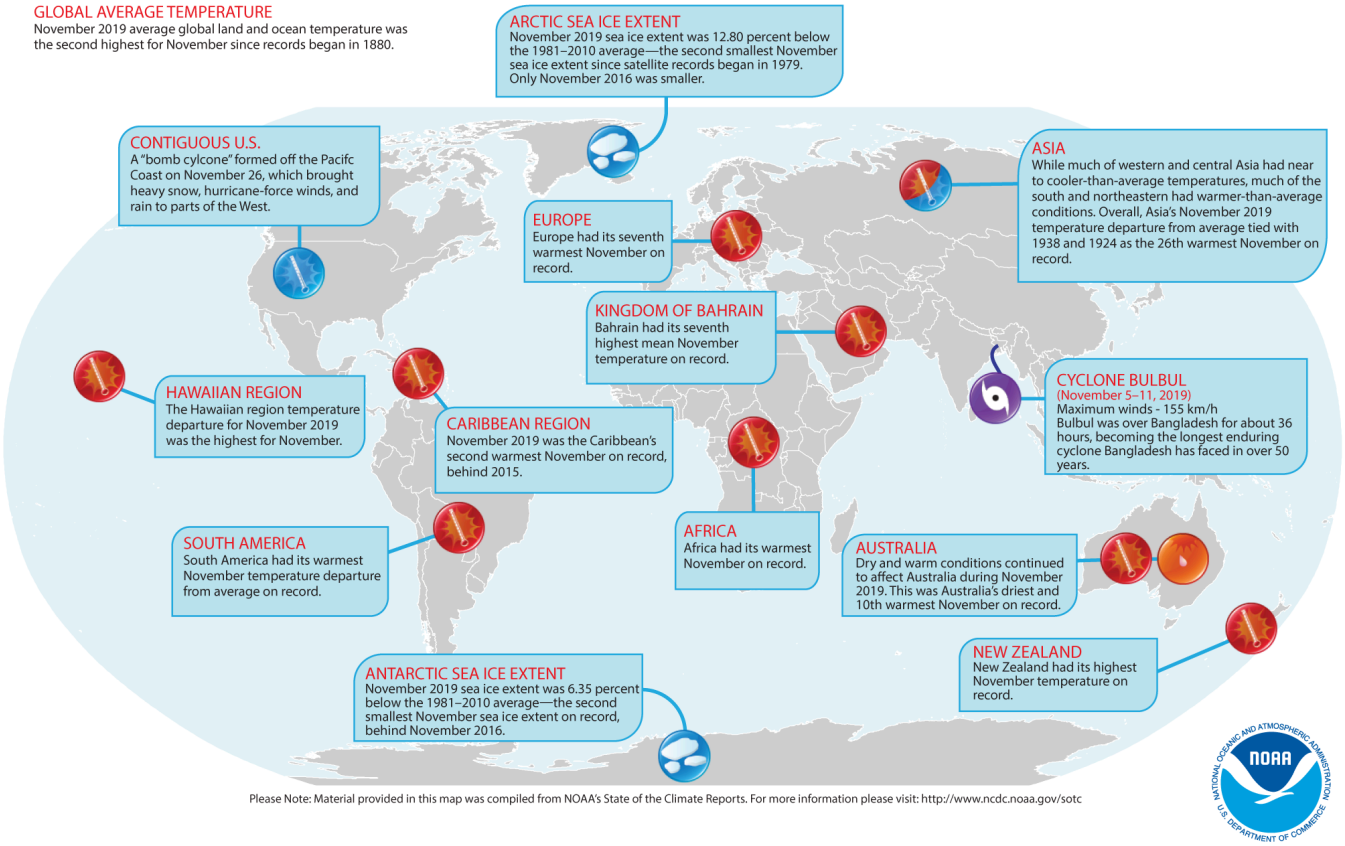


According to the National Centers for Environmental Information, 'since 1901, the average surface temperature across the contiguous 48 states has risen at an average rate of 0.14°F per decade. (see Figure 1). Average temperatures have risen more quickly since the late 1970s (0.29 to 0.46°F per decade since 1979).

In 2019, the year-to-date temperature across global land and ocean surfaces was 1.69°F (0.94°C) above the 20th-century average of 57.2°F (14.0°C) — the second highest for January–November in the 140-year record, trailing behind 2016 (+1.82°F / +1.01°C).

Record-warm temperatures during the year-to-date period were present across parts of North America, South America, Europe, the southern half of Africa, northern and southern Asia, Australia, and New Zealand. Across the oceans, record-warm year-to-date temperatures were present across parts of northern and southwestern Pacific Ocean, the Atlantic Ocean, and the western Indian Ocean. No land or ocean areas had record-cold temperatures during January–November 2019.'

NOAA National Centers for Environmental Information, State of the Climate: Global Climate Report for August 2019, published online September 2019, retrieved on April 20, 2020 from https://www.ncdc.noaa.gov/sotc/global/201908.



Significant weather anomalies were recorded in 2019 throughout the world, including a 'bomb cyclone' formed off the Pacific Coast on November 26, 2019, which brought heavy snow, hurricane-force winds, and rain to parts of the west.

NOAA National Centers for Environmental Information, State of the Climate: Global Climate Report for August 2019, published online September 2019, retrieved on April 20, 2020 from https://www.ncdc.noaa.gov/sotc/global/201908.

RESILIENCE

'...we define resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events.'

- GBI and signatories of the Industry Statement on Resilience, drawing on the work of the National Research Council

Green buildings address building and infrastructure challenges presented by population growth and climate change and the industry is evolving to place an increased focus on resilience. Per a study by Cadmus on a market characterization of resilience-based building certifications, there are currently 16 active programs, 25 published guidelines, and 6 programs in-development for resilience as of Spring 2020.

GBI partners with corporate and government entities, as well as non-governmental organizations, to increase education on sustainable thinking and to create and influence relevant assessment and reporting tools. Along with other leaders in the industry, GBI is a signatory of the Industry Statement on Resilience.

Industry Statement on Resilience:

Representing nearly 1.7 million professionals, America's design and construction industry is one of the largest sectors of this nation's economy, generating over $1 trillion in GDP. They are responsible for the design, construction, and operation of the buildings, homes, transportation systems, landscapes, and public spaces that enrich our daily lives and sustain America's global leadership.

They recognize that natural and manmade hazards pose an increasing threat to the safety of the public and the vitality of our nation. Aging infrastructure and disasters result in unacceptable losses of life and property, straining our nation's ability to respond in a timely and efficient manner. They further recognize that contemporary planning, building materials, and design, construction and operational techniques can make our communities more resilient to these threats. Drawing upon the work of the National Research Council, they define resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. As the leaders of this industry, they are committed to significantly improving the resilience of our nation's buildings, infrastructure, public spaces, and communities.

They place an emphasis on researching materials, design techniques, construction procedures, and other methods to improve the standard of practice. Through coordinated and continuous learning, design, construction and operations professionals can provide their clients with proven best practices and utilize the latest systems and materials to create more resilient communities.

They recognize the importance, and advocate at all levels of government, for effective land use policies, modern building codes, and smarter investment in the construction and maintenance of our nation's buildings and infrastructure.

Together, we plan for the future, proactively envisioning and pursuing a more sustainable built environment. The promotion of resilience will improve the economic competitiveness of the United States. Disasters are expensive to respond to, but much of the destruction can be prevented with cost-effective mitigation features and advanced planning. Our practices must continue to change, and we commit ourselves to the creation of new practices in order to break the cycle of destruction and rebuilding. Together, our organizations are committed to build a more resilient future.

Investors, credit agencies, and insurance companies are becoming the biggest drivers for resilient design, construction, and renovation for buildings. Credit agencies are starting to incorporate physical climate risks into municipal ratings and consider potential impacts on economic performance with implications for credit worthiness.

Moody's, an essential component of the global capital markets, providing credit ratings, research, tools and analysis that contribute to transparent and integrated financial markets, has noted California state and local governments could see credit quality drop due to revenue decreases and economic disruptions caused by greater frequency of fires and power shutoffs, as well as the increased costs of dealing with the impacts of power disruptions and costs of mitigation and adaptation.

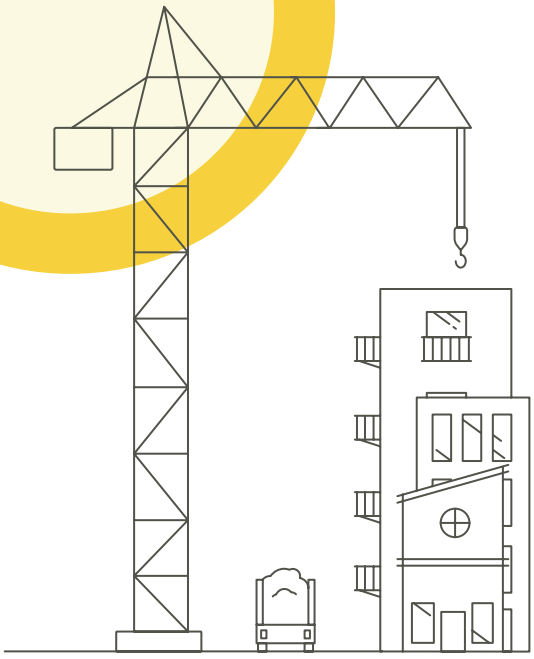
Insurance companies are also expanding their modeling to include damages caused by climate disasters and the resulting interruptions to business activities.

Statista / Autodesk. (2018) Building the Future, Keeping Up With Urban Population Growth White Paper. Statista / Autodesk, 24 August, 2018, https://damassets.autodesk.net/content/dam/autodesk/www/solutions/architecture-engineering-construction/docs/20190322_Autodesk_Whitepaper.pdf.
AIA. (2018) Industry Statement on Resilience, http://content.aia.org/sites/default/files/2019-11/Resilience_Industry_Statement_190724.pdf.

ADOPTION OF GREEN BUILDING PRACTICES

In the US, growth is expected in the green building sector, with a rise among those doing the majority of their projects green **from 32% to 45%.**

The top driver in the US for the adoption of green building practices is **client demand,** highlighting the degree to which green building is market driven.



Jones, Stephen et al. World green Building Trends, 2018. Dodge Data & Analytics, 2018.
http://images.marketing.construction.com/Web/DDA/%7Bf8b87329-bf5b-4f99-b09b-915be728b796%7D_World_Green_Building_Trends_2018_SMR_FINAL_11-24.pdf

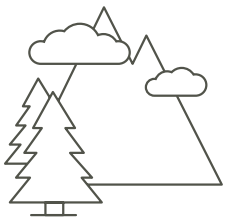
BENEFITS OF GREEN BUILDING

It is estimated that people spend 90% of their time in buildings, highlighting the importance of buildings and the impact they have on our lives.

There are numerous social, financial, and environmental benefits to green buildings, including:

SOCIAL BENEFITS

- Enhance occupant comfort, health, and productivity
- Heighten aesthetic qualities
- Minimize strain on local infrastructure
- Improve overall quality of life



ENVIRONMENTAL BENEFITS

- Enhance and protect bio-diversity and ecosystems
- Improve air and water quality
- Reduce waste streams
- Conserve and restore natural resources

ECONOMIC BENEFITS

- Reduce operating costs
- Create, expand, and shape markets for green product and services
- Improve occupant productivity
- Optimize life-cycle economic performance

Westervelt, Amy. How Our Buildings Are Making Us Sick. Forbes, 2012.

LOCAL INITIATIVES

Fortunately, many opportunities exist to implement measures that are environmentally responsible and resource-efficient throughout a building's life cycle, providing environmental, economic, and societal benefits.

Many local jurisdictions are taking a lead on sustainable building practices and integrating green certification and sustainable development policies into their legislation. Additionally, non-profit groups and initiatives are coalescing around sustainable planning, building, and construction practices, in order to build community resilience and mitigate climate change.

"Cities that lead on climate, lead on buildings"

- New York Mayor, Bill de Blasio, 2014

2020 DISTRICTS NETWORK

The vision of the 2030 Districts Network is to establish a global network of thriving high performance building districts and cities, uniting communities to catalyze transformation in the built environment and the role it plays in mitigating and adapting to climate change. Each district commits to meeting 50% reductions in energy, water and transportation related emissions.

Source: https://www.2030districts.org/about-network

SUSTAINABLE CHICAGO 2015

Chicago, with Sustainable Chicago 2015, is implementing a sustainable development policy for new construction. Various certifications, including Green Globes, are accepted under the policy.

Source: https://www.chicago.gov/content/dam/city/depts/zlup/Sustainable_Development/Publications/GreenMatrix2011DHED.pdf

HIGH PERFORMANCE GREEN BUILDING PROGRAM

Maryland has developed a High Performance Green Building Program that is applied to capital, school, and community college projects that are funded solely with state funds. State projects include all new construction projects and major renovations of existing buildings that are 7,500 gross square feet or greater. Public school projects include all new construction projects and replacement schools in which 80% or more of the final square footage is new.

Source: https://dgs.maryland.gov/Documents/GreenBuilding/regulations/HighPerformanceGreenBuildingProgram_March2017.pdf

OneNYC 2050

New York is raising the demand for sustainability measures in new construction under the Local Law 84 of 2013. OneNYC 2050 lays out the city's long-term strategic plan: requiring new buildings and major alterations be designed to an energy performance metric beginning in 2019 and set an energy performance design target beginning in 2022, leading by example through required low-energy performance design targets for City-owned new buildings and substantial renovations. Existing buildings must scale up upgrades to improve energy efficiency and reduce GHG emissions among other initiatives.

Source: http://onenyc.cityofnewyork.us/

BENEFITS OF THIRD-PARTY CERTIFICATION

ACCOUNTABILITY

Third-party certification ensures that sustainability initiatives are not value engineered out during construction and encourages improvement.

MARKETING

Green building practices are largely market driven in the United States. Building certification confirms that an unbiased, third-party organization verified your building's sustainable measures, and this can attract personnel and tenants.

COMPLIANCE

Certification ensures that building owners, facility managers and property developers meet clearly defined criteria that are focused on reducing environmental impact and increasing health and well being.

Research from the Harvard T.H. Chan School of Public Health and SUNY Upstate Medical University point to additional benefits of certification – better health and higher cognitive functions for the people who work in the buildings.

Montana Tech's New Student Center, Green Globes for New Construction, Three Green Globes, 2019

In a 2015 study of 109 participants covering 10 buildings across five US cities, the research team found that occupants of green-certified, high-performing buildings displayed 26% higher cognitive function scores compared to those in high-performing non-certified buildings. Specifically, the research showed comparable improvements in strategic thinking, the ability for workers to stay focused, and a 73% higher score in crisis response under emergency conditions for participants from the certified buildings. Participants from certified buildings also reported better sleep habits and reported fewer adverse health symptoms.

The researchers coined a new term in conjunction with this study, 'Buildingomics', which they define as the 'totality of factors in indoor environments that influence human health, well-being, and productivity of people who work in those spaces.'

> To learn more about the research the Harvard and SUNY Upstate team completed on the impact of green buildings on cognitive functions visit the study's homepage: https://naturalleader.com/thecogfxstudy/

Some building owners want to implement sustainable design with certification in mind, but they may perceive the actual certification process as being expensive and unnecessary. What this study reveals by comparing high-performing buildings and keeping the certifications as the only changing variable, is that just building for performance isn't enough. Completing green building certification can ensure that buildings are healthy environments for the people occupying them. Green Globes takes a collaborative and results driven approach to certification, with the use of third-party assessors and onsite assessments.

MARKET BARRIERS

The green building movement has overcome formidable, technical, and economic hurdles in recent years, and adoption of green building practices within the design and construction field is on the rise.The major market barriers are perceived higher upfront costs, affordability overall, complexity / bureaucracy, and time to certify.

GBI'S GREEN GLOBES THIRD-PARTY CERTIFICATION

"The Green Globes program is very flexible, and it meets the code requirements all across the country. We have found that we can use the Green Globes program for any of our markets that we operate in and it applies whether we are a tenant in the building or if we own the building."

-Kathy Loftus, Vice President of e2s

There are choices when selecting a certification rating system. Green Globes, offered by the Green Building Initiative is a practical and effective way to overcome market barriers.

The Green Building Initiative is a nonprofit organization whose mission is to accelerate the adoption of building practices that result in energy-efficient, healthier, resilient, and environmentally sustainable buildings.

As we have discussed, building construction and operation have extensive impacts on the environment, using resources such as energy, water, and raw materials. They also generate waste and emit potentially harmful atmospheric emissions.

Green Globes is a results driven and proven green building guidance and assessment program that offers an comprehensive, tramsparent, and affordable way to advance the overall environmental performance and sustainability of commercial buildings.

The GBI is the exclusive provider of Green Globes building certification in the U.S.