

# Green Buildings Certifications

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## Executive summary

Green building is the practice of constructing or modifying structures to be environmentally responsible, sustainable and resource-efficient. Several certification and rating systems have evolved around the world to measure the environmental impact of buildings. This paper explores the three dominant green building rating schemes: Building Research Establishment Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED), haute qualité environnementale (HQE). The pros and cons of each system are discussed, as well as the certification process, who can deliver a certificate, and the cost of certification

# Summary

<b>Executive summary</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>4</b>
What is green building?.....	4
What are the benefits? .....	4
How do buildings become green-certified?.....	4
<b>The BREEAM certification system</b> .....	<b>5</b>
Overview .....	5
How does this rating system work?.....	6
What buildings are covered? .....	6
BREEAM “In-Use” .....	6
Certification process .....	8
Who can deliver a certificate? .....	8
What are the cost considerations? .....	8
How long is the certificate valid? .....	10
Pros and Cons .....	10
<b>The LEED certification system</b> .....	<b>11</b>
Overview .....	11
How does this rating system work?.....	11
Bonus points.....	11
What buildings are covered? .....	11
Certification process .....	12
Who can deliver a certificate? .....	12
What are the cost considerations? .....	12
How long is the certificate valid? .....	14
Pros and Cons .....	14
<b>The HQE certification system</b> .....	<b>16</b>
Overview .....	16
How does this rating system work?.....	16
What buildings are covered? .....	17
Certification process .....	17
Who can deliver a certificate? .....	17
What are the cost considerations? .....	17
How long is the certificate valid? .....	18
Pros and Cons .....	18
Aligning BREEAM and HQE .....	18
<b>Special Section</b> .....	<b>19</b>
Green Building in China.....	19
Green Building in India .....	19
<b>Summary and Conclusions</b> .....	<b>21</b>

# Executive summary

Green building is the practice of constructing or modifying structures to be environmentally responsible, sustainable and resource-efficient throughout their life cycle. This includes efficiently using energy, water and other natural resources, protecting occupant health, improving employee productivity and reducing waste, pollution and environmental degradation.

Minimizing the impact of the build environment is critical to communities and governments worldwide, as buildings account for more than 40% of global CO<sub>2</sub> emissions and 30% of global raw materials consumption and solid waste output.

In the 21st century, the construction of green buildings has become synonymous with certifications and rating schemes. Several certification and rating systems have evolved around the world to measure, rate and rank the impact on the environment of a building's operations, site use, indoor environment and resource use. Some of these systems are commercially developed and voluntary, while others are developed in tandem with government authorities. The voluntary schemes tend to have more international appeal while the government systems are favored within that specific country.

This paper will explore the three dominant green building rating schemes that have the most buildings certified around the world. They are:

- BREEAM® - Building Research Establishment Environmental Assessment Method, originating in the UK and growing throughout Europe
- LEED® - Leadership in Energy and Environmental Design, from the United States and growing around the world
- HQE® - haute qualité environnementale or high environmental quality, originating in France.

After reading this paper, you will have a general understanding of these rating systems, the certification process, who can deliver a certificate, the cost of certification and the pros and cons of each rating system.

# Introduction

## What is green building?

Green building, also known as sustainable design, utilises a life-cycle approach to sustainable, environmental building design and operation, thus reducing the negative impact on human health and the world at large. It is a fast moving and quickly changing field due to advancements in technology and design, and evolving philosophies about how buildings should work in harmony with the natural features and resources surrounding the site.

Creating green buildings is an important focus of building owners and even governments worldwide. Buildings have a major impact on the environment, consuming large amounts of water, energy and raw materials, while producing carbon emissions and waste. The statistics are striking. Residential and consumer buildings are responsible for:

- 40% of global CO<sub>2</sub> emissions (45% in the European Union and 50% in the UK)
- 30% of global raw materials consumption and solid waste output

Buildings also consume a significant share of our total energy use, though the proportion varies by region.

## What are the benefits?

Clearly, improving the environmental footprint of buildings can go a long way toward protecting occupant health, improving employee productivity, and reducing waste, pollution and environmental degradation. In fact, the potential for improvement is quite dramatic. Creating green buildings has been shown to:

- Reduce energy use by 30–50%
- Reduce CO<sub>2</sub> emissions by 35%
- Reduce waste output by 70%
- Reduce water usage by 40%

Achieving the benefits of green building requires a comprehensive, life-cycle approach to sustainability. Site selection, design, construction, material selection and handling, operation, and maintenance all must be carefully conducted in an

environmentally conscious, energy-efficient and sustainable manner.

Green buildings typically optimise most or all of the following areas:

- Management: Building operations and quality of service
- Site: Land use and ecology; surrounding environment
- Indoor Environment: Health and well-being, comfort
- Resource Depletion: Water, energy, materials and wastes
- Innovative System Openness: Innovation in design, eco-education
- Environmental Loadings: Impact on the environment, pollution
- Socio-economic aspects: Social and economic dimensions of the construction project

In addition to direct environmental benefits, green building also enhances the reputation and standing of the building owners, whether they are private, commercial or governmental.

## How do buildings become green-certified?

A building can be green-certified by applying to one of the several certification agencies in existence today. Certification is typically a voluntary process and can be pursued by public or privately owned buildings such as schools and universities, government buildings, commercial offices, retail buildings, healthcare facilities, hotels, and private residences.

Various rating and certification systems have been developed over the years by different organisations and in different regions. While all of these systems address the same general issues and share the goal of measuring and certifying a building's "greenness," each system has its own specific processes and requirements.

On the following pages, we will focus on the three most important rating schemes for Schneider Electric: BREEAM, LEED, and HQE.

# The BREEAM certification system

## Overview

The Building Research Establishment Environmental Assessment Method (BREEAM) was the first comprehensive green building assessment system introduced in the world ([www.breeam.org](http://www.breeam.org)). Created by Building Research Establishment Ltd. in the United Kingdom in 1990, BREEAM provides a methodology to assess office, home, industrial, retail and school buildings and assign a rating based on the environmental impact of the building. The rating system was championed by John Boggart, who believed that buildings should be rated on environmental issues beyond just energy consumption.

The BREEAM certification system is widely used in the UK, and is being adopted in Europe and other parts of the world. It has been chosen as the certification system for 10 key venues at the 2014 Olympic Winter Games in Russia.

Categories	Weightings	Credits
1. Management - overall management policy, commissioning, site management, and procedural issues	12.0%	10
2. Health & Well-being - indoor and external issues affecting health and well-being	15.0%	14
3. Energy - efficiency and overall energy use	19.0%	21
4. Transport - transport-related CO2 and location-related factors	8.0%	10
5. Water - consumption and water efficiency	6.0%	6
6. Materials - environmental impact of building materials, including life-cycle impacts	12.5%	12
7. Waste - effectiveness at minimizing waste in energy, materials, processes	7.5%	7
8. Land Use & Ecology - greenfield and brownfield sites, conservation and site enhancement	10.0%	10
9. Pollution - air and water pollution issues	10.0%	12
10. Innovation - ability to find new solutions and stay at forefront of sustainability	10.0%	10

Table 1

## How does this rating system work?

BREEAM is a voluntary certification that is based on points for achieving specific criteria in ten categories, as shown in table 1.

A building is given a score for how it performs in each category. A maximum of 10 points is possible for Management, up to 14 points for Health and Well Being, and so on. Each score is weighted by a percentage, based on its relative importance.

Finally, the score is totalled as a percentage of the possible score, and the building receives one of the following ratings:

- Fail <30%
- Pass >30%
- Good >45%
- Very Good >55%
- Excellent >70%
- Outstanding >85%

## What buildings are covered?

BREEAM offers a number of measurement methodologies—based on building type—that can be used to assess the environmental performance of new and existing buildings. Standard methodologies exist for these common building types:

- BREEAM Courts
- BREEAM Ecohomes and BREEAM EcohomesXB

- BREEAM Healthcare
- BREEAM Industrial
- BREEAM International
- BREEAM Multi-residential
- BREEAM Prisons
- BREEAM Offices
- BREEAM Retail
- BREEAM Education
- BREEAM Communities
- BREEAM Domestic Refurbishment

Less common building types that don't fit one of the above categories can use the BREEAM Other Buildings assessment.

Buildings outside the UK can be assessed using BREEAM International or BREEAM Office Europe.

## BREEAM “In-Use”

BREEAM In-Use, launched in 2009, is an assessment method that helps building owners evaluate building operational costs and environmental performance after occupation. It consists of an online self-assessment tool, third party certification, and provides a clear roadmap to sustainability improvements by highlighting problem areas, recommending improvements, and validating corporate social responsibility commitments. To date, BREEAM In-Use is only available in the UK. The certification process and costs are different from other BREEAM ratings.

The BREEAM In-Use assessment is divided into three parts:

- Asset performance (the building)
- Building management performance (the operation of the building)
- Organisational effectiveness (how occupiers manage their activities within a building)

The BREEAM In-Use assessment evaluates the same categories as standard BREEAM

assessments, including: energy, water, materials and waste, health and well-being, pollution, transport, land use and ecology, and management. However, since each part of the evaluation varies slightly, the points are distributed somewhat differently. For example, Management is not measured in Part 1 (asset performance) and Transport is not measured in Part 2 (building management). However, as in standard BREEAM assessments, the Energy category holds the most weight in all three parts. (See table 2 below).

### Section Weighting

Category	Part 1: Asset rating	Part 2: Building management rating	Part 3: Organisational rating
Energy	26.5%	31.5%	19.5%
Water	8.0%	5.5%	3.5%
Materials and waste	13.5%	7.5%	16.0%
Health and well-being	17.0%	15.0%	15.0%
Pollution	14.0%	13.0%	10.5%
Transport	11.5%	--	18.5%
Land use and ecology	9.5%	12.5%	5.0%
Management	--	15.0%	12.0%

Table 2

## Certification process

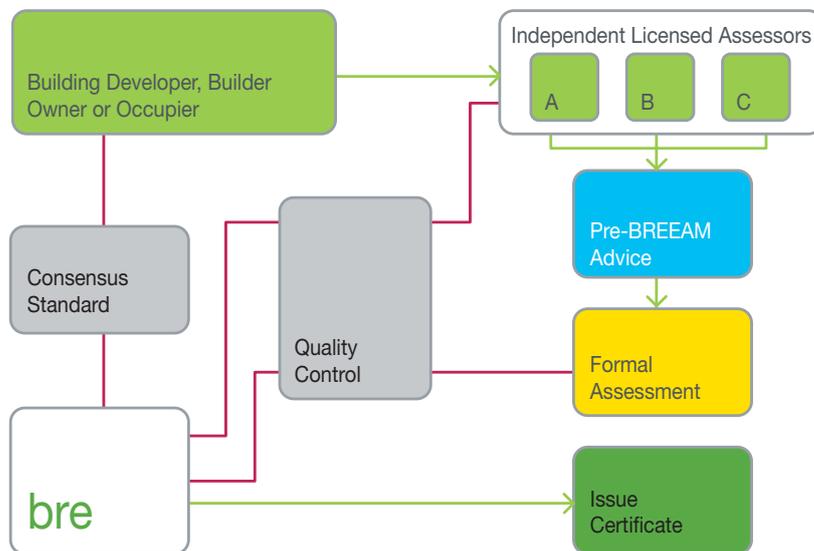
Certification for BREEM is done through an independent licensed assessor. A building owner can apply for an interim BREEAM certification in the design stage, but the final certification is awarded during the Post Construction Stage (PCS), before handover and commissioning of the building.

The certification process follows these steps:

1. The building owner or manager (the customer) should identify which BREEAM version is applicable (Industrial, Healthcare, Offices, Retail, Education, etc.)
2. The customer should also establish the rating level they wish to achieve; PASS, GOOD, VERY GOOD, EXCELLENT, or OUTSTANDING.
3. The customer then contacts an independent licensed assessor at the concept design stage (or as early as possible in the design process). An assessor can help the customer understand what needs to be done in order to maximise building performance, minimise capital costs, and achieve the desired rating.
4. The next step is for the assessor to collect information on the project. The assessor will need the assistance and cooperation of the entire design team in order to accurately complete the assessment.
5. Upon completion of the BREEAM assessment, the assessor will forward a copy of the report to BREEAM's Building Research Establishment (BRE) office for quality assurance.
6. Once BRE has quality-assured the assessment, the project will be certified and project details will be added to the BREEAM Database.

## Who can deliver a certificate?

An independent licensed assessor must assess the building, and BREEAM's Building Research Establishment (BRE) office issues the certificate. BRE is the certification and quality assurance body for BREEAM ratings. BRE trains, examines and



Source: www.breem.org

licenses organisations and individuals to carry out the assessment process. Any building professional can become trained and licensed to deliver BREEAM ratings.

## What are the cost considerations?

There are two types of costs to consider in BREEAM certification for new buildings. First are the costs of the assessment, registration and certification. These costs are quite easy to predict. Second are the additional costs to construct or renovate. These costs are difficult to predict.

### Certification fees for BREEAM in new buildings

Membership fee	0
Registration fee	£650
Review fee	Design and procurement: £1500 Post Procurement: £1000
Pre-certification fee	0
Certification fee	£350-£850

### Fees for BREEAM In-Use:

For 1 to 30 assets (buildings)	
Initial Registration fee	£100 per asset
Certification fees	Part 1: £100 per certificate. Part 2: £100 per certificate. Part 3: 1 certificate is included in registration for assets < 100 m <sup>2</sup> . If > 100 m <sup>2</sup> then £100 per certificate.
Ongoing fees (applicable after first year of registration)	Per Asset: £200 flat fee for assets < 100 m <sup>2</sup> (includes annual registration and three certifications). Per Asset Annually: £350 flat fee for assets > 100 m <sup>2</sup> (includes registration and three certifications). Part 3 only: £100 flat fee for assets < 100 m <sup>2</sup> (includes registration and one certificate). Part 3 only: £200 flat fee for assets > 100 m <sup>2</sup> (includes registration and one certificate).
For 31 to 200 assets (buildings)	
Application fee	£12,500 total fee
Annual License fee	£10,000 total fee

### Additional Construction Costs

Often, a sustainable building (even without a green certification) will have a cost premium compared to a building that only meets minimum building code. However, other factors should be considered when considering costs and value

of a sustainable building, including aesthetics, functionality, increased property value, higher tenant retention rates, higher leasing rates, and improved performance.

When budgeting for a green building project, the first thing to consider is the owner's facility needs. How sustainable does the owner want the building to be? A building that is designed to operate with no need for a utility connection (a net-zero energy building) will cost more to build than a building designed to demonstrate more practical and cost-effective sustainable strategies.

The additional construction costs associated with a BREEAM certification can vary widely depending on what measures have been implemented already and the score that you would like to achieve.

The most recent comprehensive study of BREEAM rating costs was completed in 2006. In *Schools for the Future – The Cost of BREEAM Compliance in Schools*<sup>1</sup> it was found that in some circumstances the exponentially increasing costs of achieving the additional credits for an Excellent rating can detract significantly from the project's affordability.

Score	BREEAM rating	Cost
40	Good	Little or no extra cost
55	Very Good	£19/m <sup>2</sup> additional cost
70+	Excellent	May cost an extra £60/m <sup>2</sup>

An Excellent rating could be difficult to achieve without incorporating a suitable renewable energy solution, which will often be the only practicable method of achieving this rating.

<sup>1</sup> [http://www.fgould.com/media/files/schools\\_for\\_the\\_future.pdf](http://www.fgould.com/media/files/schools_for_the_future.pdf)

## How long is the certificate valid?

BREEAM new construction certificates do not expire, but BREEAM In-Use certificates expire after three years for single asset assessments, and after just one year for portfolios and Part 3-only assessments.

## Pros and Cons

### Pros

- Consistently “moves the goalposts.” Over time, best practice, regulations, legislation, and codes of practice all get revised. BREEAM raises the bar and challenges project teams to meet the higher standards recognised by the BREEAM ratings.
- Allows comparison and benchmarking between different types of buildings.
- Independently audited.
- Can assess any building.
- Well commissioned building automation system required for at least one point.
- Additional credit(s) for metering in connection with building automation system.

### Cons

- A building could achieve an excellent rating without really tackling energy efficiency. There is an ongoing debate about whether there should be a minimum rating for energy intensity and how that target should be decreased over time to continually drive energy efficiency.
- Point distribution is constantly debated. For example, energy efficiency is critical but can be expensive. A bike rack receives a full point but is inexpensive and may never be used. The distribution and weighting of points can heavily drive behavior.
- The system only takes into account the building envelope or shell when coming up with energy scores. Buildings can actually use more energy (than conventional buildings) if tenants do not understand and support procedures.
- Requirements are very exact.
- Relatively high cost of requirements.
- No added credits for automatic light control.

# The LEED certification system

## Overview

Leadership in Energy & Environmental Design (LEED) is an internationally recognised green building certification system developed by the U.S. Green Building Council (USGBC) ([www.usgbc.org](http://www.usgbc.org)). It provides third-party verification that a building or community was designed and built using strategies aimed at improving building performance from a sustainability perspective.

The most recent version of this system is LEED 2009.

## How does this rating system work?

The LEED Green Building Rating Systems™ are voluntary certifications. All LEED systems are based on credits awarded for achieving specific criteria in the following 7 categories:

1. Sustainable Sites
2. Water Efficiency
3. Energy and Atmosphere
4. Materials and Resources
5. Indoor Environmental Quality
6. Innovation in Design (bonus points)
7. Regional Priority (bonus points)

LEED is based on a straightforward point system. Credits are awarded in the green categories according to these parameters:

- Credits are worth a minimum of one point.
- Credits are positive, whole numbers; there are no fractions or negative values.
- Credits receive a single, static weight; there are no individualised scorecards based on project location.
- There are 100 base points available, with up to 10 additional bonus points for Innovation in Design (or Operations) and Regional Priority.

LEED 2009 for New Construction and Major Renovations (NC) certifications are awarded according to the following scale:

- Certified 40–49 points
- Silver 50–59 points
- Gold 60–79 points
- Platinum 80 points and above

## Bonus points

While the maximum base score is 100, up to 10 additional bonus points can be earned for Innovation in Design and Regional Priority.

Innovation in Design can earn up to six bonus points. These points were created for several reasons:

- Technologies and strategies are constantly evolving.
- Some strategies may be employed that are not directly covered within the general measurement categories.
- Some practices may produce results that dramatically exceed existing LEED criteria.
- The role of LEED accredited professionals in facilitating integrated design strategies should be acknowledged.

Regional bonus points were created to acknowledge the importance of local conditions and geographically specific environmental issues. USGBC regional councils and chapters have identified six credits per rating system that are of particular importance to specific areas. Each regional priority credit is worth an additional one point, and a total of four regional priority points may be earned.

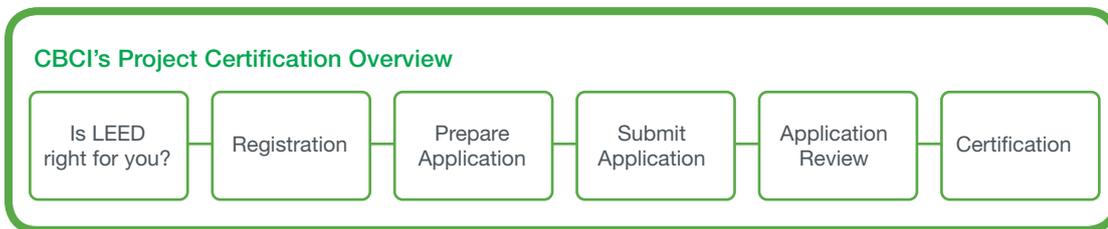
## What buildings are covered?

The LEED rating systems are designed to rate new and existing commercial, institutional, and residential buildings. The rating systems are:

- LEED for New Construction (NC)
- LEED for Existing Buildings (EB): Operations and Maintenance (O&M)
- LEED for Commercial Interiors
- LEED for Retail
- LEED for Schools

Things to know about LEED:

- It is always written and pronounced as LEED - there is no "s" at the end
- Buildings are certified and people are accredited



Source: [www.cbci.org](http://www.cbci.org)

- LEED for Healthcare
- LEED for Core & Shell
- LEED for Homes
- LEED for Neighborhood Development

Building types include—but are not limited to—offices, retail and service establishments, institutional buildings (e.g., libraries, schools, museums and religious institutions), hotels, and residential buildings of four or more habitable stories.

All LEED systems use the same credit/point ratings described above, which maintains consistency and usability across rating systems.

## Certification process

Unlike BREEAM, LEED does not require independent assessors and auditors. Buildings are rated by the building owner or project team following LEED guidelines, and the documentation and rating are then reviewed and approved by the Green Building Certification Institute (GBCI).

A building owner or project team interested in earning LEED certification must first register the project with The Green Building Certification Institute (GBCI), the organisation that provides third party verification services for LEED certification. Projects (except for LEED for Homes) must be registered online using the LEED Online tool ([www.gbci.org](http://www.gbci.org)). This online tool is a resource for project team members to manage the documentation process that leads up to certification.

To earn LEED certification, the applicant project must satisfy all the prerequisites and pass review by GBCI. Projects are then rated according to the degree of compliance described previously, and an appropriate certification is issued.

## Who can deliver a certificate?

Certificates are delivered by the Green Building Certification Institute (GBCI). GBCI requires a LEED Project Administrator to submit an application for review. Any member of the project team can be the Project Administrator including a consultant, the building owner or the building operator.

By default, the person who registers the project will become the Project Administrator for LEED Online. This person should be a LEED-AP (accredited professional), if possible, and should be experienced and knowledgeable about LEED certification projects and process. This person is responsible for managing the assignment of team roles in LEED Online and the management of all LEED documentation and coordination throughout the certification process.

## What are the cost considerations?

As with BREEAM, there are two types of costs to consider in LEED certification. First are the costs of the assessment, registration and certification. These costs are easy to assess or predict. Second are the additional costs to construct or renovate. These costs are quite difficult to predict.

### Certification Fees

Membership fee to USGBC	\$300-\$12,500
Registration fee	\$900 for members \$1200 for non-members

## Current LEED Certification Fees for single building projects

	Less than 50,000 Square Feet*	50,000- 500,000 Square Feet*	More Than 500,000 Square Feet*	Appeals (if applicable)
<b>LEED 2009; New Construction, Commercial Interiors, Schools, Core &amp; Shell full certification</b>	Fixed Rate	Based on Square Footage*	Fixed Rate	Per credit
<b>Design Review</b>				
USGBC Members	\$2,000	\$0.04/sf	\$20,000	\$500
Non-Members	\$2,250	\$0.045/sf	\$22,500	\$500
Expedited Fee**	\$5,000 regardless of square footage			\$500
<b>Construction Review</b>				
USGBC Members	\$500	\$0.010/sf	\$5,000	\$500
Non-Members	\$750	\$0.015/sf	\$7,500	\$500
Expedited Fee**	\$5,000 regardless of square footage			\$500
<b>Combined Design &amp; Construction Review</b>				
USGBC Members	\$2,250	\$0.045/sf	\$22,500	\$500
Non-Members	\$2,750	\$0.055/sf	\$27,500	\$500
Expedited Fee**	\$10,000 regardless of square footage			\$500
<b>LEED for Existing Buildings</b>	Fixed Rate	Based on Square Footage*	Fixed Rate	Per credit
<b>Initial Certification Review</b>				
USGBC Members	\$1,500	\$0.03/sf	\$15,000	\$500
Non-Members	\$2,000	\$0.04/sf	\$20,000	\$500
Expedited Fee**	\$10,000 regardless of square footage			\$500
<b>Recertification Review***</b>				
USGBC Members	\$750	\$0.015/sf	\$7,500	\$500
Non-Members	\$1,000	\$0.02/sf	\$10,000	\$500
Expedited Fee**	\$10,000 regardless of square footage			\$500
<b>LEED for Core &amp; Shell: Precertification</b>	Fixed Rate			Per credit
USGBC Members	\$3,250			\$500
Non-Members	\$4,250			\$500
Expedited Fee**	\$5,000			\$500
<b>CIRs (for all Rating Systems)</b>				\$220

Source: [www.gbci.org](http://www.gbci.org)

\* Project square footages to be used for Certification Fee pricing should be based upon the definition of Gross Floor Area which is provided in the LEED 2009 MPR Supplemental Guidance. **However, all parking areas (whether underground, structured, or at grade) should be excluded from the square footage calculations used to determine the certification fee.** Other spaces such as common areas, mechanical spaces, and circulation should be included in the gross square footage of the building.

\*\* In addition to regular review fee. Availability of expedited review timelines is limited based on GBCI capacity. Contact GBCI at least ten (10) business days prior to submitting an application to request an expedited review.

\*\*\* The Existing Building Recertification Review fee is due when the customer submits the application for recertification review.

### Additional Construction Costs

Studies by MHTN Architects and the American Chemistry Council have estimated cost premiums for LEED buildings and the simple payback of the investment in sustainability, based on the level of LEED certification. The cost premiums for LEED ratings are shown in table 3.

### Pros and Cons

#### Pros

- Strong marketing – a large investment has been made worldwide to grow the brand of the U.S. Green Buildings Council and LEED certification. This has led to large market awareness and adoption in many countries.

	LEED Certified	LEED Silver	LEED Gold	LEED Platinum
<b>Estimated Cost Premiums</b>	0.5–3 percent	3–4 percent	5–6 percent	7–12 percent
<b>Payback of Investment</b>	4-year payback	5-year payback	6-year payback	8-year payback

Table 3

In this table, the payback was calculated using LEED-related energy savings to offset the initial cost premium. Savings are achieved through average reductions of 15% in utility bills and 2-3% in operating expenses.<sup>2</sup>

### How long is the certificate valid?

LEED NC (New Construction) certificates do not expire. However, project teams are encouraged to apply for ongoing recertification under LEED EB O&M (Existing Buildings: Operations & Maintenance) within two years of initial certification. If this opportunity has been missed then the building must complete the comprehensive process to be certified as LEED EB.

Recertification under LEED EB is free. To maintain LEED EB status, buildings must file for recertification at least once every five years, though they may apply for recertification each year if desired. If projects do not recertify at the five year mark, their next application is treated as an initial certification application.

- Driving innovation – LEED has driven a market transformation so products and services are available that did not exist previously.
- Lots of information available – many organisations are involved in LEED certifications. Because of this, a wealth of information is available for training, accreditation and review.
- LEED does not require an independent assessor and training and many project teams see this as a benefit, since individual project teams can certify their own buildings. (There is a perception that independent assessors may somehow slow the process or otherwise interfere.)
- LEED Accreditation is a respected qualification in the construction industry and can add credibility to a person or a company in the green buildings space.
- LEED provides additional credit(s) for metering in connection with building automation system

<sup>2</sup> [http://www.larsonallen.com/EFFECT/Q\\_A\\_Understanding\\_LEED\\_Certification.aspx](http://www.larsonallen.com/EFFECT/Q_A_Understanding_LEED_Certification.aspx)

## Cons

- Expensive – LEED certification is seen as an expensive and lengthy process while other certifications (like Energy Star) seem faster and less expensive in comparison.
- Intense documentation is required which makes obtaining a certification incredibly time consuming.
- No independent audit – while this can be considered a benefit as stated above, it can also be a disadvantage. Certified assessors bring quality control and standardisation that can increase the effectiveness of a rating scheme.
- LEED certification process for new buildings does not require energy use to be reported, or even kept track of.
  - o There is a perception that LEED NC certification focuses attention on the appearance of energy efficiency, not its accomplishment. The LEED system does this by rewarding designers for calculating that a building will save energy, not for proving that a building actually saves energy or reaches an energy benchmark. The LEED EB O&M rating has made some progress here but energy efficiency is still undervalued in the total rating.
  - o Designers can feel under pressure to make the image of being “green” a priority over actual energy efficiency. Example: mounting solar panels, or installing bike racks at the bottom of several flights of stairs.
- Recent changes have been made to set minimum requirements for energy use. For example, energy reduction is considered in the LEED rating system for existing buildings, but it is a minority of the consideration for a rating, and the requirement is that the building uses less energy than 60% of comparable buildings. In other words, it can use more energy than about 40% of comparable buildings, which is a low bar indeed.
- Difficult to implement in Europe as LEED certification is oriented to American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) instead of European Norm (EN).

# The HQE certification system

## Overview

HQE ([www.assohqe.org](http://www.assohqe.org)) is the acronym for *haute qualité environnementale* (“high environmental quality”). It is a voluntary certification scheme developed in France and designed to assess and monitor a building environment’s impact on the planet. The Association, whose members range from French ministries and other government agencies to engineering firms, architects and construction material manufacturers, was founded in 1996. Its goal is to define and promote building environment quality reference guides and tools. While HQE is predominantly used in France, attempts are being made to internationalise it.

The HQE approach is two fold, encompassing both organisation and operations.

**Organisational** - The HQE Environmental Management System (EMS) defines the tools required to structure and conduct the interface between the various parties involved in the project. The EMS includes an examination of the site, the objectives of the operation and the needs of the future users.

**Operational** - The HQE Environmental Building Quality (EBQ) system is built around 14 targets grouped into four main families, bringing together a range of environmental concerns about building and construction sites. The client must hierarchically define 14 targets including standards target performance levels, to create a building environmental quality profile.

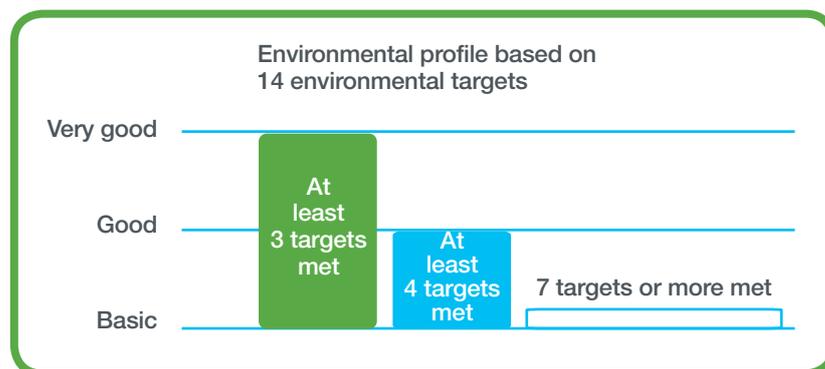
## How does this rating system work?

HQE is based on a simple three-level system of performance:

- “Basic” corresponding to current regulations or normal practice
- “Good” for best practices
- “Very good” for maximum performance, yet achievable

Using this scale, a building is rated for how it performs in each of the 14 environmental issues listed above. Then, the building itself receives one of these ratings.

### HQE: minimum environmental profile



\* Source: [www.certivea.com/uk](http://www.certivea.com/uk)

For a building to receive minimum certification, it must receive a “very good” rating for at least three issues, “good” for at least four and “basic” for no more than seven. For the “good” and “very good”

### Eco-construction:

1. Harmonious relation between buildings and their immediate environment
2. Integrated choice of products and construction materials.
3. Low site nuisance

### Eco-management:

4. Management of energy
5. Management of water
6. Management of waste caused by activities
7. Management of servicing and maintenance

### Comfort:

8. Hygrometric comfort
9. Acoustic comfort
10. Visual comfort
11. No unpleasant smells

### Health:

12. Sanitary quality of areas
13. Sanitary air quality
14. Sanitary water quality

\* Source: [www.certivea.com/uk](http://www.certivea.com/uk)

rankings, a “principle of equivalence” is allowed. That is, the applicant can suggest an alternative assessment approach to that described in the HQE reference framework in the case of any of the 14 issues. An energy target of four must be reached for the building to reach a good or very good rating.

HQE is linked with the French thermal regulation (RT 2005, to date). In particular the building energy performance (Target 4: energy management) can be assessed according to the Energy Labels defined by the French Government (HPE, THPE, BBC and beyond).

## What buildings are covered?

HQE offers a reference framework for most build types:

- Offices
- Schools
- Retail
- Hotel
- Healthcare
- Logistics platforms
- In use for rating all the above but Healthcare
- Logistics facilities
- Sports arenas

## Certification process

HQE for new construction rating focuses more directly on the simulation or measurements of primary non-renewable energy and control of emissions. Certification is issued upon completion of audits of the Environmental Management System (EMS), and Environmental Building Quality (EBQ). The energy performance labels defined by the French government are granted an option under this certification. Independent audits are issued at the end of design brief, design, and construction phases. Audits are conducted by Certivéa ([www.certivea.fr](http://www.certivea.fr)), an accredited certification body and subsidiary of the

Scientific and Technical Centre for Building (Centre Scientifique et Technique du Bâtiment, or CSTB). CSTB is a state-owned industrial and commercial cooperative, placed under the administrative authority of the French Ministry of Sustainable Development.

## Who can deliver a certificate?

Certivéa, a subsidiary of CSTB, is recognised for the delivery of the certifications. An auditor is assigned by the certification body (Certivéa) in order to audit the management system and to check the environmental performance of the building. This will occur at three key steps of the project: at the end of the brief phase, at the end of the design phase, and at the end of the construction phase. The first two phases can be validated during same audit.

## What are the cost considerations?

The following estimates are based on 2006-2007 costs.

Registration fee	€ 1200
Pre-review fee	€ 650
Audit fees	Buildings < 3 000 m <sup>2</sup> : 13000 € HT Buildings between 3 000 and 30 000 m <sup>2</sup> : 12000 € HT plus 0,40 € HT per m <sup>2</sup>

### Estimated cost premiums

According to HQE association, premiums can range from one to 20% with up to 25% depending on the targeted performance levels. A 10% premium is generally observed.

## How long is the certificate valid?

There's no time limit to an HQE certification.

## Pros and Cons

### Pros

- The technical part of the system is structured along a set of 14 issues that are now well known by French professionals, having been disseminated through conferences, training programs, written publications, etc., for five years.
- Instant credits for efficient building automation system and metering.
- Additional credit for high performance in energy efficiency.

### Cons

- The system still meets opposition and criticism among some designers. These critics think the HQE approach should remain a "free movement" used voluntarily. They fear standardisation of the approach will lead to building design driven by certification requirements.
- French only standard.
- Driven by French regulations.

## Aligning BREEAM and HQE

A memorandum of understanding was signed in June 2009 between BRE Global CSTB, and Certivéa to align the HQE and BREEAM assessment methods. A first step towards aligning the methods was made through the SB Alliance ([www.sballiance.org](http://www.sballiance.org)) which was co-founded by BRE Global and CSTB in May 2008 at the request from the EPAD (the organisation managing the La Défense business area in Paris). An increasing number of new towers in La Défense were applying for two or three certifications, since various schemes have different advantages (e.g. financial incentives vs. international value) and different approaches (performance vs. descriptive + final

note). SB Alliance defined six common indicators between BREEAM and HQE, including energy, waste and indoor air quality, as well as their assessment and reporting framework.

However, after a number of discussions it was decided that the relationship between CSTB and BRE Global should be taken a step further in order to avoid confusion in the market and to address the specific conditions in the French market, which is very dynamic and internationally orientated.

The following objectives were defined by the agreement:

- Phase 1: adaptation of BREEAM to France by CSTB/Certivéa (in particular translation of the schemes to French, further adaptation of the criteria to the local regulatory context, implementation of the BREEAM operational processes etc.) within six months. In the meantime, BRE Global will remain the only certification body for BREEAM in France.
- Phase 2a: Certivéa becomes the sole representative of BREEAM in France and offers BREEAM as an option to the *NF Bâtiments tertiaires, démarche HQE* certification during 36 months. Both certifications will be delivered in parallel: the *NF Bâtiments tertiaires, démarche HQE* certification, and the BREEAM FR certification adapted to the French market. It will therefore be up to the clients to decide which scheme they want to use.
- Phase 2b: alignment of the schemes to develop a third generation certification scheme for the French market which will be fully relevant to the local context and compliant with the internationally agreed regulations and certification principles. The timescale for Phase 2 is likely to be between 18 and 24 months (from a start date of January 2010).
- Phase 3: delivery of one unique certification scheme in France by Certivéa which will be consistent and comparable with the other BREEAM certifications in Europe.

# Special Section

## Green Building in China

In China, there are two major options for green building certification: one is LEED and the other is a Chinese certification, the Green Building Design and Green Building Evaluation labels.

### LEED in China

As in many countries, LEED certifications have followed international investment in buildings in China. The majority of LEED-certified buildings in China are internationally owned and occupied office buildings. The first LEED-certified building was the Century Prosper Center, which was certified under LEED for Core & Shell in 2003. To date, about 150 buildings have been or will soon be LEED certified in China. Multinational corporations are establishing a stronger presence in Chinese cities, driving demand for LEED-certified commercial building space.

### Chinese certification

The Green Building Design Label was officially launched in 2007 by MOHURD (Ministry of Housing and Urban-Rural Development), a Chinese governmental agency. It certifies buildings based on the building's preliminary design. The Green Building Evaluation label certifies the building based on its actual performance. These labels cover similar topics as LEED, including considerations of land use, energy, water, and materials, as well as indoor air quality and performance. Until as recently as June of 2009, only about 10 designs had received the Green Building Design Label. In the last six months, however, the Chinese government has certified hundreds of buildings under the Green Building Design Label, a process that happened "basically overnight," according to one industry source. Since the program was developed by the Chinese government, it is likely to be the certification of choice for the majority of green buildings in China in the long term. Some international real estate developers have begun adopting the Green Building Design Label, as well.

### U.S. and China cooperation

The construction supply chain in China is not well adapted to green building programs such as LEED.

As a result, green building certification remains relatively expensive, according to industry sources. In addition, builders seeking LEED certification face a dearth of LEED APs that can monitor the certification process (though the USGBC recently conducted a round of training for LEED APs in China). Thus, many building projects require foreign professionals to conduct the process, a costly addition to construction. To address some of these barriers, the governments of China and the United States signed a memorandum of understanding in July 2009 to facilitate informational and technological exchange, including HVAC, insulation, lighting, and on-site renewables. China may also move toward domestic R&D and manufacturing of green technology and materials to support its growing green building industry, thereby reducing the cost of green building in China.

### Green dynamics in China

Product differentiation is the current major driver of green buildings in China, rather than environmental concerns or operating cost savings, according to EMSI Consultants. The country is using green building as an opportunity to reduce building vacancies and increase rents. Long term, however, the importance of energy efficiency in China's building sector will grow because electricity demand is already beginning to outstrip supply. Consequently, the buildings that will be built to house and employ China's urbanizing population in the next decade will face pressure to limit energy consumption.

## Green Building in India

Green building in India has grown dramatically over the last five years through the adaptation of the LEED system to India (under the name LEED India), as well as the development of the India Green Building Council (IGBC) ([www.igbc.com](http://www.igbc.com)) and numerous building certification programs. Certifications in India include:

- LEED India for New Construction (NC), primarily for office buildings.
- LEED India for Core & Shell (CS), primarily for office buildings.

- GRIHA (Green Rating for Integrated Habitat Assessment), a government-supported program, also known as the National Building System ([www.grihaindia.org](http://www.grihaindia.org)).

### LEED India

Two LEED programs have been developed specifically for India: LEED India for New Construction (NC) and LEED India for Core & Shell (CS). Although these programs cover similar building types as their counterparts in the United States, the criteria and requirements are tailored to the Indian building context. The programs were jointly developed by U.S. Green Building Council (USGBC) and India Green Building Council (IGBC) and are maintained by IGBC.

Foreign companies tend to find that building green in India is less expensive compared with other regions because of the lower costs of LEED documentation and analysis in India. Thus, international firms typically hire Indian agencies to do as much of the work as possible. Industry sources report that LEED Silver or Gold can often be achieved at no incremental cost if the certification process is conducted properly.

LEED U.S. programs are also technically available (e.g., Existing Buildings, Commercial Interiors, etc.), as they are in all regions, but they are more difficult to use in India than the LEED India versions. As a result, builders are more likely to use LEED India or IGBC programs where possible.

### Green Rating for Integrated Habitat Assessment (GRIHA)

GRIHA is a system developed jointly by the Indian Ministry of New and Renewable Energy (a government agency) and The Energy and Resource Institute (TERI), a prominent Indian non-governmental organisation. GRIHA has established a growing presence in the public building sector. Although the requirements of GRIHA are similar to those of LEED, the documentation process is significantly different. It uses a star system ranging from one to five and the GRIHA can be used for both new and existing applications.

### Green dynamics in India

Growth in the commercial and residential building sectors is accelerating. Virtually all green building in India will occur in new construction. Industry experts expect about 200 million to 250 million square feet per year of new, non-residential construction. Much of this development will happen on the edges of urban downtowns, where land is available. In the commercial space, office and retail buildings will likely be the primary areas of focus.

One of the main drivers of green building in India is the observation among building owners that vacancy rates are lower in certified green buildings than in their conventional counterparts. The brand value of LEED is very high in India, driven largely by the presence of American and other international tenants and building developers. Because of LEED's international reach, the program is more attractive to foreign tenants. As a result, LEED is a higher priority for Indian builders looking to attract foreign tenants. Speculative real estate developers in India are more likely to select LEED for its market value than other available programs in India. The idea that green building creates a better building—and the associated market differentiation benefits that accompany it—is of higher priority for the green building market in India than reduced operational costs. Brand value will likely remain the central driver of green buildings in India into the future.

In terms of green building certification programs, about three-quarters of green projects are commercial buildings receiving a LEED certification (measured in terms of building footprint), with the remainder distributed between the other programs. However, trends indicate that the other programs will take an increasing share of the Indian market.

# Summary and Conclusions

Green Building certifications were created to minimise the impact of the built environment on our world. The certifications described here have a common goal but different approaches that have created a variety of strengths and weaknesses. Unfortunately these weaknesses have created obstacles and confusion around green building for the construction market, end users, building owners and building operators.

The most advanced and well understood area of green building is energy. Energy management, monitoring and efficiency have been explored and honed over the past 30 years making this the easiest area for progress. To drive ongoing energy reduction and optimised performance of buildings, it is important to focus on systems that promote the following:

- Energy monitoring and reporting.
- Well commissioned building automation systems.
- Integrated building automation system and metering.
- Certification of buildings that must be renewed every one to three years.
- Certification based on actual energy use data over a defined period of time.
- Maximum energy use requirements (kWh per square meter or square foot).

As discussed in this paper, no rating system meets these requirements yet and those discussed here are changing and evolving every day. If a country or region is beginning to explore rating systems, then it would be important to influence the design community to adopt or adapt rating schemes that promote the bullet points above.

What you can do today is educate yourself on the green building certification schemes in your country or region, become involved in organisations or committees that are working to adopt green buildings, and be a champion for the customer by endorsing green building rating schemes that deliver long-term and sustained energy savings to building owners and operators.

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