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# Study on Environmental Assessment Tools for Building Green Certification

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***Abstract*** **- Buildings are responsible for a significant portion of global energy use and greenhouse gas emissions. With population growth and urbanization on the rise, we have to rethink the way we build cities to enable greener and smarter living for all. Building with a vision for the future means thinking ahead to reduce our environmental impact. In this context the green certification of buildings is a method of evaluating their energy performance and environmental impact. This study examines environmental assessment tools commonly used for building green certification, including LEED (Leadership in Energy and Environmental Design), BREEAM (Building Research Establishment Environmental Assessment Method), and others used in Romania. These tools evaluate the sustainability of buildings across categories such as energy efficiency, water use, materials and resources, indoor environmental quality, and site selection. Choosing the right tool depends on the specific goals, location, and size of the building. Overall, these assessment tools provide a framework for promoting sustainable building practices.**

***Keywords*** **–** ***energy efficiency, environmental assessment, green building certification, materials and resources, sustainable building practices, sustainability, water use***

## 1. INTRODUCTION

The most important civil engineering projects being undertaken all over the world involve the continuous development of infrastructure, constructions of all kinds, energy facilities, drinking water supply and waste water treatment, to name just a few of them. Unfortunately, the unprecedented development of all civil engineering fields often results in a harmful effect for both people and the environment: pollution, in all its forms. The level of environmental pollution and its effects have become visible and translate into various phenomena, from global warming, to directly affecting health and even the quality of life, which urgently calls for effective measures to be taken to ensure a level at least acceptable for sustainability. Thus, some of the areas where concrete steps have been taken to impose standards in terms of sustainability and reduction of energy consumption are those of building construction, community master plans and infrastructure projects.

Any building has a direct impact on the environment. During construction, use or even when renovated, a building uses water and energy, generates waste and emits harmful emissions. Buildings account for over 30% of total energy consumption and 40 to 50% of CO2 emissions in Europe. [1]

All this has led to the creation of ecological standards, certifications and rating systems, the purpose of which is to reduce the impact on the environment. In this context, green building certification programs have emerged to promote more sustainable building practices. These certification programs evaluate buildings based on their environmental performance across various categories, such as energy efficiency, water use, materials and resources, indoor environmental quality, and site selection.

There are several environmental assessment tools that are commonly used for building green certification. These tools are designed to evaluate and measure the environmental performance of buildings across a variety of categories, such as energy efficiency, water use, materials and resources, indoor environmental quality, and site selection. Globally, more than 20 rating systems have been developed and some of the most commonly used certification programs include BREEAM (Building Research Establishments Environmental Assessment Method) - Great Britain, LEED (Leadership in Energy and Environmental Design) - United States of America, Green Star – Australia, ASBEE (Comprehensive Assessment System for Building Environmental Efficiency) - Japonia, DGNB – Germania.

In Europe, the first system of this kind appeared in the 90s, in UK- BREEAM -, followed in 2000 by the LEED system, in USA. Moreover, these two types of certifications are also the most common for buildings in Romania.

LEED is one of the most widely recognized and used green building certification programs, developed by the U.S. Green Building Council (USGBC)[2].

LEED provides a framework for evaluating the sustainability of buildings, with different levels of certification depending on the number of points earned. LEED considers factors such as site selection, water efficiency, energy use, materials and resources, indoor environmental quality, and innovation.

BREEAM is a similar certification program developed by the Building Research Establishment (BRE) in the UK, that evaluates buildings across several categories, including energy use, materials, pollution, transport, and ecology. Like LEED, BREEAM also provides different levels of certification based on the number of points earned and representing over 81% of all commercial building certifications in Europe, according to statistics made in 2014. [3]

Green Globes is another green building certification program that evaluates buildings across a variety of categories, including energy use, indoor environmental quality, site selection, and materials. Green Globes allows for self-assessment, which can be appealing for smaller buildings or those on a tighter budget.

The Living Building Challenge is a more rigorous green building certification program that seeks to promote the creation of buildings that are regenerative and self-sufficient. This certification program evaluates buildings across seven performance areas, including site, water, energy, health, materials, equity, and beauty.

All of these assessment tools provide a framework for evaluating the environmental performance of buildings and can be useful for promoting sustainable building practices. Each of these programs offers a unique framework for evaluating building sustainability, with varying levels of certification. Choosing the right tool depends on factors such as the specific goals of the project, the location, and the size of the building.

This study aims to examine these environmental assessment tools and provide insight into their strengths and weaknesses.

The objectives of this study are as follows:

- To examine the environmental assessment tools commonly used for building green certification, including LEED, BREEAM and Green Homes used in Romania. This objective is important to provide an understanding of the available assessment tools and their differences to facilitate informed decisions about which tool is best suited for a particular project.
- To identify the categories used to evaluate building sustainability in each of these tools, including energy efficiency, water use, materials and resources, indoor environmental quality, and site selection. This objective is important to understand the key factors that contribute to building sustainability and to help prioritize areas for improvement.
- To compare the different levels of certification provided by each tool, and the requirements for achieving each level. This objective is important to provide a comprehensive understanding of the certification process, and to determine the most appropriate level of certification for a given project.
- To evaluate the strengths and weaknesses of each tool, and to provide recommendations for selecting the most appropriate tool for a specific project. Importance: This objective is important to provide a critical assessment of each tool, and to help stakeholders select the most appropriate tool to achieve their sustainability goals.

The importance of these objectives lies in providing a comprehensive understanding of the available assessment tools, their categories and levels of certification, and their strengths and weaknesses, to enable informed decision-making that promotes sustainable building practices.

Ultimately, the goal is to promote sustainable building practices that minimize the environmental impact of buildings while providing healthy and comfortable spaces for occupants.

In Romania, the green certification of buildings is regulated by the national standard SR EN ISO 16001 [4] and can be applied to new or to existing buildings. Through certification, buildings can achieve a degree of energy efficiency and a level of comfort for users, while reducing their impact on the environment. The certification can be carried out only by the accredited company and can be used to obtain a tax advantage or to create a built image in the real estate market.

Romania has its own green building certification program called "GREEN HOMES", which is based on the EU Building Performance Directive and other international standards. The GREEN HOMES certification is offered by the Romanian Green Building Council (RoGBC) and assesses the environmental performance of residential buildings based on categories such as energy, water, indoor environment, and materials. The certification program aims to promote sustainable building practices and to encourage the construction of energy-efficient and healthy homes in Romania.[5]

## 2. MATERIALS AND METHODS

The methodology used in this study involves a comprehensive literature review of academic articles, industry reports, and other relevant publications related to green building certification programs, including LEED, BREEAM and "GREEN HOMES" mainly used in

Romania. The literature review will be used to identify the key categories used to evaluate building sustainability, the levels of certification offered by each tool, and the strengths and weaknesses of each tool.

To provide a critical assessment of the assessment tools, the literature review will be supplemented by interviews with experts in the field of green building and sustainable design, including architects, engineers, and sustainability consultants. These interviews will provide insights into the practical applications of the certification tools, as well as their strengths and limitations.

The originality of this methodology lies in the combination of a comprehensive literature review and expert interviews to provide a critical assessment of the available environmental assessment tools for building green certification. This approach will enable a more nuanced and detailed understanding of the tools, their categories and levels of certification, and their practical applications.

Many global organizations of green building were cooperating on green building issues. The major green building global network is the World Green Building Council (WGBC). The WGBC is a global non-profit organization that aims to transform the building and construction industry towards sustainability. It was founded in 2002 and is headquarters in London, UK. The organization is made up of more than 70 Green Building Councils (GBCs) from around the world, which are national or regional organizations that promote green building practices in their respective countries or regions.[6]

The WGBC works to promote sustainable building practices through advocacy, research, and education. Its activities include advocating for green building policies and regulations, conducting research on the economic and social benefits of green buildings, and developing educational resources and training programs for building professionals.

The WGBC is also responsible for several global initiatives, such as the Net Zero Carbon Buildings Commitment, which aims to ensure that all new buildings are net zero carbon by 2030, and all existing buildings are renovated to net zero carbon by 2050. The organization also coordinates World Green Building Week, an annual event that brings together green building councils and partners from around the world to promote sustainable building practices.

Overall, the World Green Building Council plays an important role in promoting sustainable building practices worldwide, and its efforts are critical to achieving a more sustainable built environment for future generations.

The WGBC encourages the member countries to set their own green building assessment criteria. Green building assessment criteria of Romania are:

- LEED, a rating system for the design, construction, and operation of green buildings. It awards points for various environmentally friendly features and practices, such as energy efficiency and use of renewable energy. The number of points a building earns determines its certification level, with the highest-level being LEED Platinum [7], [8].
- BREEAM, on the other hand, focuses on a wider range of environmental performance criteria, such as energy use, transport, water, materials, waste, land use and ecology, health and well-being, pollution and pollution prevention, and management process. BREEAM also includes an assessment of the entire life cycle of the building, including operation, maintenance and demolition.
- The "Green Homes", a certification system applicable to the residential buildings sector, offered by the Romanian Green Building Council (RoGBC) and assesses the environmental performance of residential buildings based on categories such as energy, water, indoor environment, and materials. The certification program

aims to promote sustainable building practices and to encourage the construction of energy-efficient and healthy homes in Romania.

### *2.1. LEED ecological certification of buildings*

**LEED** is the world's most widely used green building certification program. More than 150 nations and territories throughout the world have embraced it at the time of date. Since 1994, more than 41.500 projects have received LEED certification, totaling 391.2 million square meters of assessed floor area. Another 42.600 buildings are presently working toward LEED. LEED certified projects by countries are ilustrated in Figure 1.

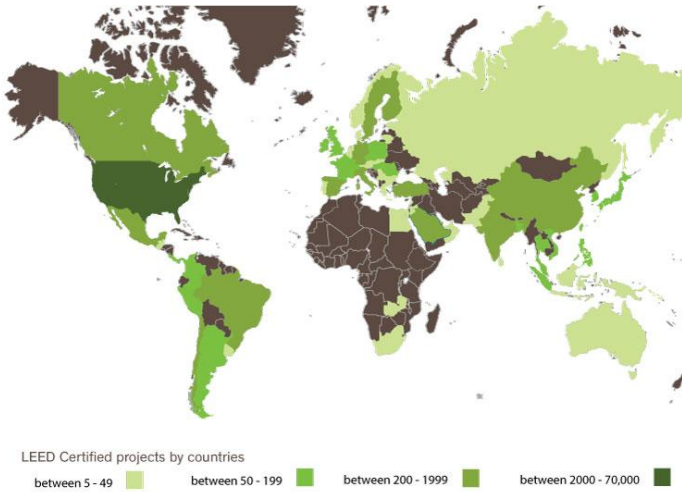


**Fig. 1** LEED certified projects across the world [7]

LEED uses a point system to evaluate and certify green buildings. The point system is divided into several categories, each with its own set of prerequisites and credits. Buildings can earn points by meeting certain performance levels or by implementing specific sustainable design and construction practices. The following table provides an overview of the categories and credit types included in the LEED rating system:

**Table 1** LEED categories and credit types [7]

| No. | Category | Credit Types |
|---|---|---|
| 1 | Energy and Atmosphere | Basic Building Systems, Energy Use and Green Power, Enhanced Building Systems, On-Site Renewable Energy |
| 2 | Indoor Environmental Quality | Indoor Air Quality, Lighting, Thermal Comfort, Acoustics, Indoor Chemical and Pollutant Source Control |
| 3 | Materials and Resources | Construction Waste Management, Materials Reuse, Recycled Content, Regional Materials, Rapidly Renewable Materials |
| 4 | Water Efficiency | Water Efficient Landscaping, Innovative Wastewater Technologies, Water Use Reduction |
| 5 | Innovation | Innovation in Design, Innovation in Operations, Innovative Green Building Strategies |

| No. | Category | Credit Types |
|---|---|---|
| 6 | Regional Priority | Regional Priority Credits, Location and Transportation, Sustainable Sites, Stormwater Management, Heat Island Reduction |

The number of LEED credit points earned by a building can vary depending on the specific features and practices implemented, as well as the version of the LEED rating system being used. The total number of credit points available to LEED applicants varies depending on the specific version of the rating system and the type of building being certified. In general, the total number of credit points available ranges from 80 to 110 points (Figure 2).

However, to earn a certification, a building must earn a certain number of points in each of the categories outlined in the previous table and next figure.

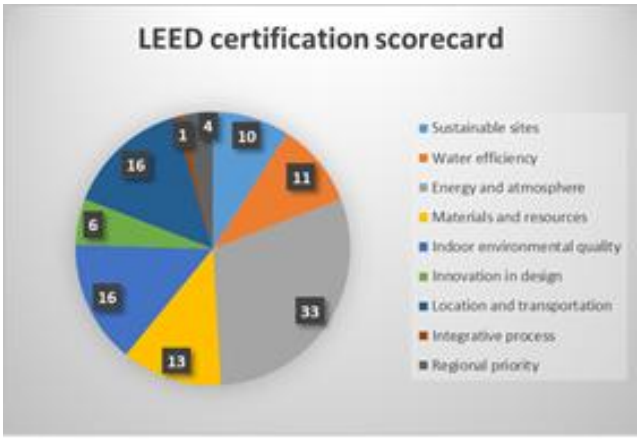


**Fig. 2** LEED certification scorecard by categories

LEED rating system is flexible enough to be applied to all building types – including commercial, residential and entire neighbourhood communities.

It works throughout the building's life cycle – as well as design and construction, operations and maintenance, tenant fit-out and significant building retrofit (Figure 3).

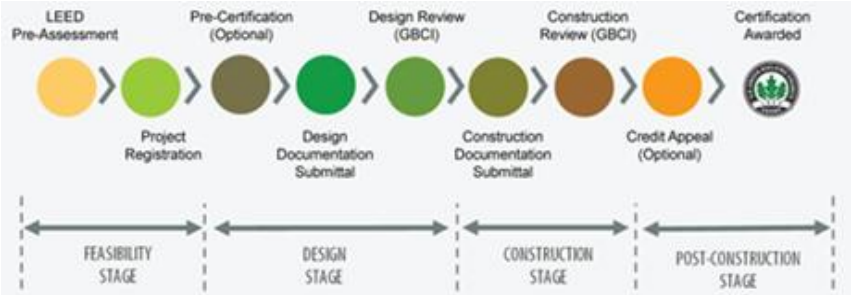


**Fig. 3** LEED certification process[9]

The table below shows the minimum number of points required for each certification level:

**Table 2** LEED certification level

| LEED Certification Level | Interval Limit Points Required |
|---|---|
| Certified | 40-49 points |
| Silver | 50-59 points |
| Gold | 60-79 points |
| Platinum | 80 or more points |

It's important to note that these are the minimum point requirements and buildings can earn more points than required to achieve a higher certification level. Additionally, these requirements may vary depending on the specific version of LEED rating system, for example, in some cases the minimum point for LEED Platinum may be different certification.

### *2.2. BREEAM ecological certification of buildings*

Another example of ecologic certification of buildings is **BREEAM** which also evaluates environmental performance of buildings and infrastructure in terms of energy use, transport, water, materials, waste, land use and ecology, health and well-being, pollution and pollution prevention, and management process. BREEAM is common in European countries, Middle East, Asia and South Africa (Figure 4).

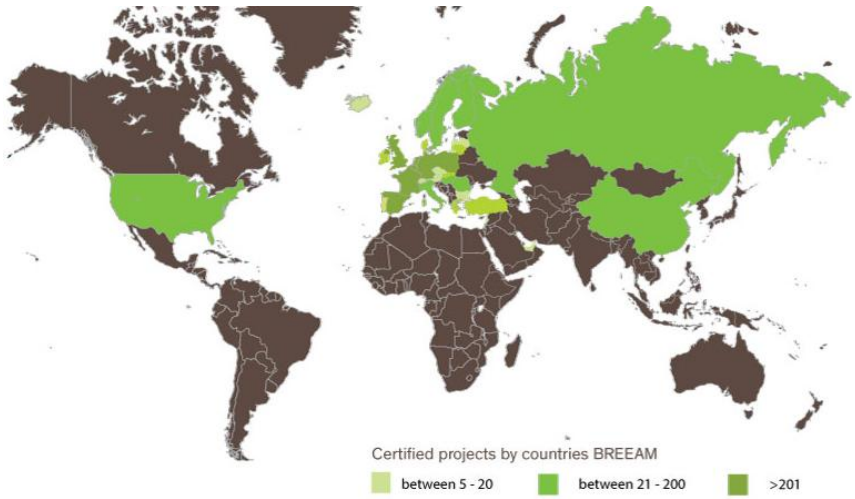


**Fig. 4** BREEAM certified projects across the world [10]

The highly adaptable BREEAM rating technique is employed for assessing buildings of all shapes and sizes. It is applicable to new construction, renovation and fit-out projects, as well as building retrofit operations and maintenance. Under the BREEAM Bespoke evaluation, non-standard buildings can be evaluated against specific criteria.

Both a BREEAM International scheme and nation-specific BREEAM ratings were created in an effort to promote even greater global acceptance. The following table provides an overview of the categories and credit types included in the BREEAM rating system:

**Table 3** BREEAM categories and credit types [10]

| No. | Category | Credit Types |
|---|---|---|
| 1 | Energy | Building operational energy and CO2 emissions |
| 2 | Management | Management policy, Commissioning, Site management and procurement |
| 3 | Health and Wellbeing | Indoor and external issues (noise, light, air, quality, etc.) |
| 4 | Materials and Resources | Environmental impacts of building materials |
| 5 | Transport | Transport-related $CO_2$ and location-related factors |
| 6 | Water consumption and Efficiency | Building consumption and efficiency |
| 7 | Waste | Construction and operational waste management |
| 8 | Pollution | Water and air pollution |
| 9 | Land Use & Ecology | Site and building footprint and ecological value and conservation |
| 10 | Innovation | Innovation in Design, Innovation in Operations, Innovative Green Building Strategies |

Like LEED, BREEAM also provides different levels of certification based on the number of points earned (Figure 5).

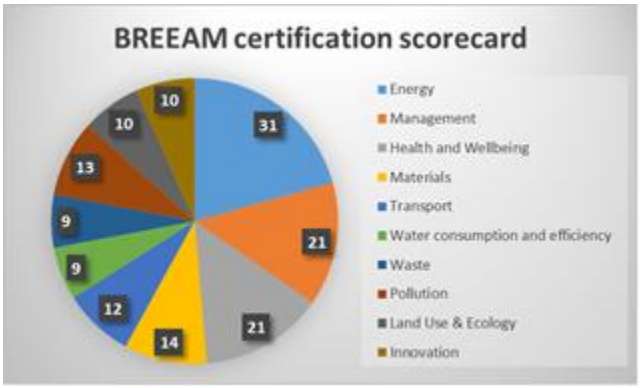


**Fig. 5** BREEAM certification scorecard by categories

A weighting is added once each criterion has been scored. There are minimum requirements that must be met depending on the desired rating level. Certain innovations may need additions. The final score is then converted into one of the following ratings on the BREEAM certification scale: pass, good, very good, excellent, and outstanding. The table below shows the limit interval number of points required for each certification level:

**Table 4** BREEAM certification level

| BREEAM Certification Level | Interval Limit Points Required |
|---|---|
| Good | 45-54 points |
| Very Good | 55-69 points |
| Excellent | 70-84 points |
| Outstanding | 85 -150 points |

BREEAM assessments are carried out by independent assessors in two stages: a design stage assessment, resulting in an interim certificate being issued, and a post-construction assessment, resulting in a final certificate being issued and rating awarded (Figure 6).

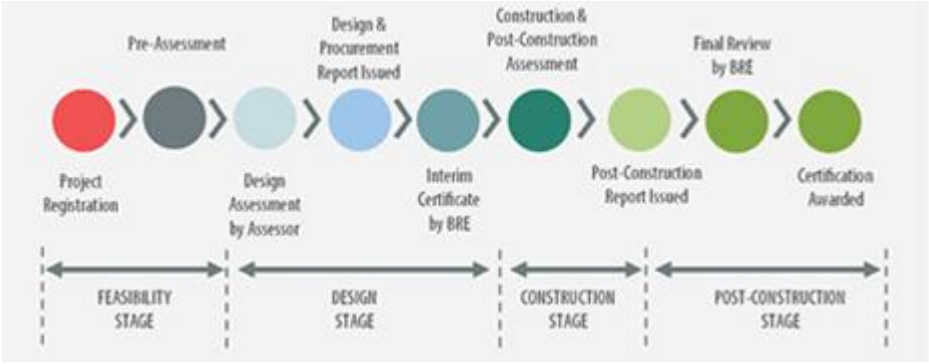


**Fig. 6** BREEAM certification process[10]

### *2.3. Green Homes ecological certification of buildings*

**Green Homes** encourages the building of better quality, healthier and financially beneficial housing for occupants. "Green Homes" was created to combat the social, economic, and environmental challenges facing Romania, such as illegal deforestation, the excessive use of finite natural resources, the use of toxic materials, poor waste management practices generated both in the construction stage, as well as the building operation.[11]

Green Homes uses also a point system to evaluate and certify sustainable buildings. The point system is divided into several categories, each with its own set of prerequisites and credits. Buildings can earn points by meeting certain performance levels or by implementing specific sustainable design and construction practices. The following table provides an overview of the categories and credit types included in the Green Homes rating system:

**Table 5** Green Homes categories and credit types[11]

| No. | Category | Credit Types |
|---|---|---|
| 1 | Environmental Leadership | Integrated Design, Life Cycle Assessment, Construction Waste Management Planning, Responsible construction practices, Operational waste management, Commissioning for supply |

| No. | Category | Credit Types |
|---|---|---|
| | | and Return air Flow Testing, Mechanical Ventilation Testing and Low Leakage |
| 2 | Ongoing performance | Transparency and Information sharing, Education for homeowners / Ensuring Green Performance |
| 3 | Site and Location | Sustainable site, Site Ecology and Biodiversity, Heat Island Effect Reduction, Rainwater management, Reduced light pollution, Access to amenities, Alternative transportation |
| 4 | Water Efficiency | Water metering Required, Water efficient fixtures, Fully Operational greywater system, Water Efficient landscaping |
| 5 | Materials and Resources | Natural materials, Reclaimed materials, Local/regional cladding materials, Recycled content, Environmentally Responsible Sources, Low volatile organic compounds (VOC), Fire resistant materials, Renewable materials |
| 6 | Human Health &Wellness | Radon safety, Formaldehyde, VOC & Particulate testing air testing before home occupancy, Acoustic comfort, Biophilic Design Urban Farming/Food Production/ Permaculture |
| 7 | Energy Optimisation | To reduce excessive energy use, shift toward low carbon energy solutions, improve energy security, and reduce energy costs |
| 8 | Innovation | Various Ideas & Solution to improve the green performance |

The number of Green Homes credit points earned by a building (Figure 7) can vary depending on the specific features and practices implemented, as well as the version of the Green Homes rating system being used.

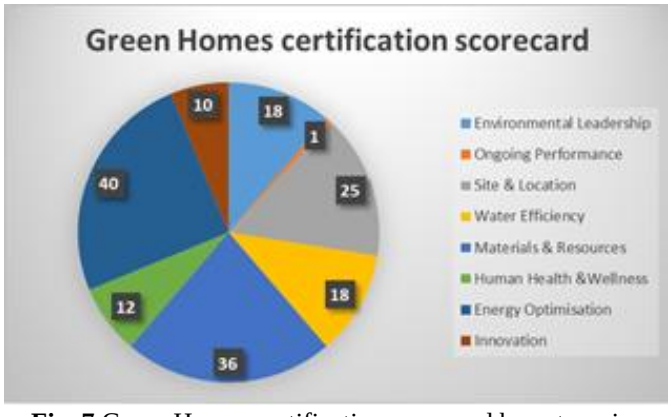


**Fig. 7** Green Homes certification scorecard by categories

However, to earn a certification, a building must earn a certain number of points in each of the categories outlined in the previous table. The table below shows the limit interval number of points required for each certification level:

**Table 6** Green Homes certification level

| Green Homes Certification Level | Interval Limit Points Required |
|---|---|
| Certified | 80-99 points |
| Excellent | 100-129 points |
| Superior | 130-160 points |

## 3. RESULTS AND DISCUSSIONS

The most used certification systems in Romania for the ecological certification of buildings are BREEAM, LEED and GREEN HOMES. They are developed by different organizations, but they share the same goal of promoting sustainable design and construction practices. These are voluntary but recognized by the national and international market. All three systems provide certification levels, with higher levels indicating better performance. In LEED the levels are: *Certified, Silver, Gold, and Platinum*. In BREEAM: *Pass, Good, Very Good, Excellent, and Outstanding*. In Green Homes the levels are: *Certified, Excellent and Superior*.

Recently, three more certification systems have entered the market: EDGE, WELL and GREEN BUILDING. The most significant increase in the number of certifications was observed in 2018, the trend being an upward one.

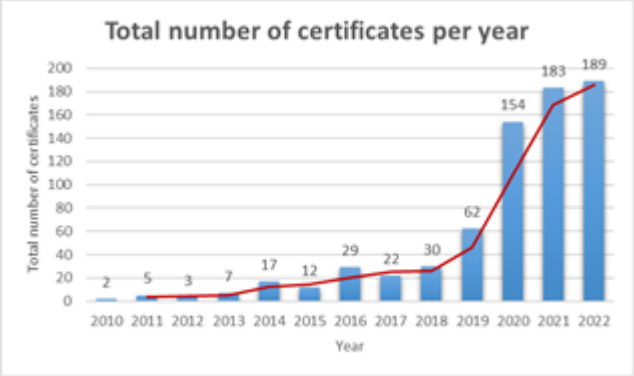


**Fig. 8** Number of certified projects per year in Romania

Starting in 2018, sustainable development practices dominated the real estate market, and the number of certifications registered a remarkable rise and continued to grow all over the country. At the end of 2020, there were over 330 real estate projects certified according to BREEAM and LEED norms.

Currently, 183 buildings (98 newly built and 85 existing buildings) have been certified to international standards in Romania. Of these, 39% are in Bucharest, followed by cities such as Cluj-Napoca, Timisoara, Iasi, Brasov (Figure 9).

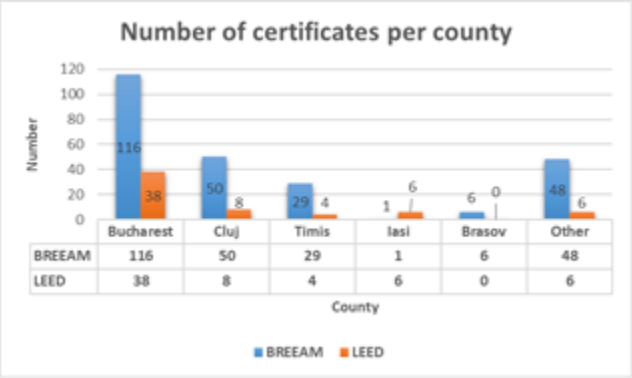


**Fig. 9** Number of certified projects per county in Romania

Regarding the regional distribution of certification, Bucharest continues to have the largest area of green buildings with a total of 1.1 million square meters of certified buildings. Cluj Napoca has more than 430,000 square meters and Timisoara comes in third place with 307,000 square meters of green space. (Figure 10). However, other cities are quickly catching up.

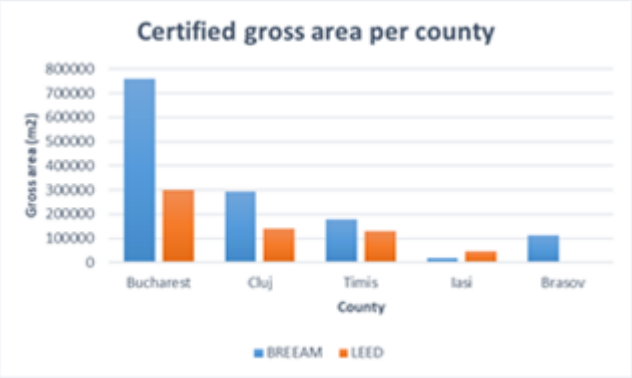


**Fig. 10** Certified builfdings gross area per county in Romania

Green building certifications have expanded beyond commercial developments, gradually reaching the public area as well," the report states. [12]. Gathering all the certified surfaces in Romania, they accumulate 7.84 million square meters. Most of the green buildings are offices, but retail comes strongly behind. Offices represent 3.38 million square meters, that is 43%. Industrial and residential together represent a little less than 6%, but show rapid growth, so the difference will be reduced in the coming years (Figure 11).

As it can be seen from the figure above, offices and retail are competing for the first positions in terms of the share of spaces certified as green from the total of real estate projects in Romania. Thus, if offices lead with a percentage of 43%, retail follows with a weight of 34%, according to the report made by Build Green, a consulting company in the segment of sustainable certifications and development of efficient buildings, regarding sustainable development.

Regarding the highest level of performance, so far only three buildings have obtained the Outstanding qualification in the BREEAM system: the BINARIUM building in Cluj-Napoca, a conversion of a disused industrial site, the former Flacăra factory; the Lidl store on Strada Căpitan Aviator Alexandru Șerbănescu no. 58A from Bucharest, which recently obtained the highest percentage in the world (99.1%) in the BREEAM system; 3) the Penny Market Otopeni building, with a score of 95.2%.

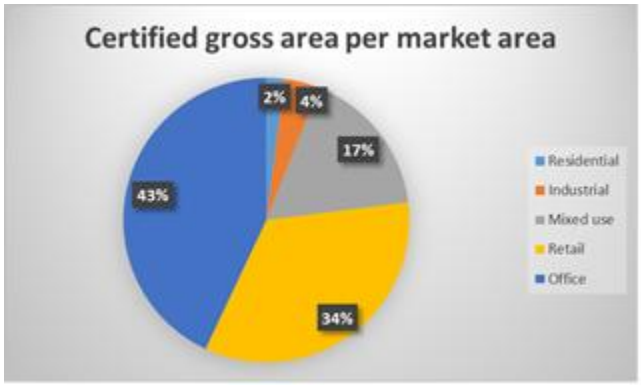


**Fig. 11** Certified builfdings gross area per market in Romania

In the LEED certification system, 11 buildings achieved the highest performance qualification, PLATINUM, listed in the order of the score obtained: Business Garden Bucharest Building A, Bucharest (98), Business Garden Bucharest Building C, Bucharest (97), Business Garden Bucharest Building B, Bucharest (96), Timpuri Noi Tower Building, Bucharest (87), Arctic Diamond Washing Machine Factory Find (85), Orhideea Towers, Bucharest (84), Therme Bucharest, Balotești (84), The Bridge 2, Bucharest (84), The Bridge, Bucharest (82), Globalworth Tower, Bucharest (81), DB Global Technology, Bucharest (80) [13].

Regarding Green Homes certifications, to date, over 18,000 housing units in Romania have been certified or are in the process of being certified as Green Homes [11].

Regarding the existing buildings versus new constructions, certifications of existing buildings, which account for 54% of the certificates issued, remain the dominant segment of the Romanian market (Figure 12).

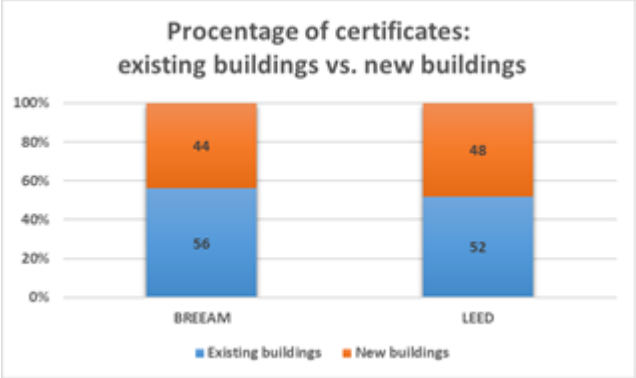


**Fig. 12** Certified builfdings: existing buildings versus new buildings

### *3.1. BREEAM vs. LEED vs. GREEN HOMES – What's the difference?*

While both programs deal with the environmental sustainability of a building, the biggest difference between the two is how the rating is awarded:

- BREEAM uses licensed assessors who examine evidence against credit criteria – if BRE decides that the building project meets its requirements, BREEAM accreditation can be issued.
- LEED does not use assessors to collect evidence for certification. Instead, the building design team collects data and sends it to USGBC. Only once this information is reviewed can the building receive LEED certification.
- GREEN HOMES certification is offered by the Romanian Green Building Council (RoGBC) and assesses the environmental performance of residential buildings. It is important to note that this certificate is specific to homes. It is not for office buildings or shopping centers. This certification proves that homes have an increased degree of energy efficiency and implicitly reduced monthly costs for utilities but also increased comfort for tenants.

### *3.2. Benefits of these certifications*

Research has shown that buildings certified under LEED tend to have lower energy and water consumption than non-certified buildings. However, the relationship between LEED points and specific climate outcomes, such as carbon emissions, is complex and can vary depending on factors such as the building's location and use. Additionally, LEED does not have a specific requirement for on-site renewable energy, so a building can achieve high certification without having a significant impact on climate change.

Overall, LEED certification can be an important tool for reducing the environmental impact of buildings, but it is important to consider the specific features and practices that are contributing to the building's score, and to evaluate whether they are leading to meaningful climate outcomes.

However, BREEAM adds more structure to the design process, meaning it is much easier to gain approval. Furthermore, it can be seamlessly adapted to local contexts. For example, with BREEAM Bespoke, the assessor can work with BRE to develop assessment criteria specifically tailored to a building that does not fit the sustainability criteria, whereas LEED was not created with this level of adaptability.

The launch of the GREEN HOMES certification in synergy with the Romanian Green Building Council-Green Mortgage program in 2014 positively influenced the residential buildings sector. Currently, 1149 homes have been certified and another 5389 are in the process of being certified. The GREEN HOMES certification system is internationally recognized and is in the process of being implemented in 12 other countries through the SMARTER Finance for Families program.[11]

The goal of GREEN HOMES is to support the creation of green homes through a credible, cost-effective certification program. The GREEN HOMES certification proves that homes have an increased degree of energy efficiency and implicitly reduced monthly costs for utilities but also increased comfort for tenants. This certification represents an opportunity for investors and developers to differentiate their projects through their quality and environmental performance, while educating their clients about the environmental and financial benefits.

## 4. CONCLUSIONS

Resource efficiency is not only a trend, but also a necessity when it comes to building construction. Ten years ago, achieving sustainable certification was mostly a marketing decision for office building developers, but in recent years this trend to develop energy efficient office buildings has become a normal fact. The main advantage is given by operating costs, which are reduced by up to 30% compared to a standard building – a fact that has a positive impact on total costs. The use of green technologies increases occupancy as well as the value of the building. In the case of buildings considered models of good practice, green buildings mean resource-efficient, energy-efficient buildings with a healthy indoor environment, infrastructure for alternative transport, but also for separate waste collection, plant walls, grassy terraces, renewable energy sources and many other similar measures.

The building green certification has, to a point, some similarity with the environmental impact studies for the assessment process provided for in the Romanian legislation. But, apart from the fact that it is not a mandatory step, this certification looks more at the side of the sustainable value that the projects offer from the perspective of various aspects - from energy to ecology and over all to sustainability.

Each of the categories analyzed for certification within a project must meet high standards in the field of project impact, carbon reduction, sustainability and resilience, adaptation to climate change. At the same time, the added value brought in the field of ecology and biodiversity protection is evaluated, especially in the case of large-scale projects, such as those in the field of building construction.

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