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Green building certification systems: An assessment of the city of Izmir

Duygu Gökce*
Onur Tos**
Harika Tos***

Abstract

This study examines the sustainability performance of LEED and BREEAM-certified green buildings in Izmir, province of Türkiye, in terms of certification levels, assessment categories, building types and the environmental strategies implemented. Guided by a conceptual framework based on sustainability, sustainability in architecture, urban sustainability, the green building approach and international certification systems, the research aims to provide a comparative assessment at a local-scale. A qualitative research approach was adopted in the study; document analysis was used as the data collection technique. Data obtained from ÇEDBİK, USGBC, BREEAM and relevant project sources were classified according to certification type, certification level, total score, credit categories, building function and sustainability strategies; and interpreted using descriptive statistics and comparative content analysis. In this respect, the study distinguishes itself from research focusing on a single building type or a single certification category by developing a multi-typology evaluation framework based on the example of Izmir province. The findings show that there are 32 LEED-certified projects in Izmir and four BREEAM certification records associated with three separate buildings or projects. It was determined that performance in LEED-certified buildings is concentrated in the categories of energy and atmosphere, water efficiency, indoor environmental quality, location and transport, and sustainable sites; however, the materials and resources category is under-represented. BREEAM projects, on the other hand, are characterised by the operational performance of existing buildings, environmental management, energy and water conservation, waste control, user comfort and safety measures. Furthermore, it has been observed that sustainability priorities vary according to building function; different strategies are prominent in office, industrial, commercial, residential and transport buildings. The study reveals that green building practices in Izmir are spreading across different building functions; however, the publicly available records examined are insufficient to directly assess the spatial and socio-economic dimensions of this spread. Based on the findings, it is recommended that the strong practices observed in energy and water efficiency be maintained; while sustainability strategies relating to materials and resource management, the operational performance of existing buildings, and building functionality should be developed through local policies and incentives.

Keywords: green building, Izmir, LEED and BREEAM certifications, sustainability

1. Introduction

Industrialisation, rapid urbanisation, population growth and the intensive consumption of natural resources are placing multidimensional pressures on the ecological balance, giving rise to environmental, economic and social consequences (Mebratu, 1998; Bozlağan, 2010). These developments have highlighted the inadequacy of explaining the concept of development solely in terms of economic growth; they have brought to the fore a sustainability approach that addresses environmental limits, social welfare and intergenerational justice collectively (WCED, 1987; Purvis et al., 2019). As the impacts of the built environment on the natural environment have become increasingly apparent, the concept of sustainability has also found its way into the fields of architecture and building construction. Within this framework, buildings' energy and water

*(Corresponding author) Department of City and Regional Planning, Suleyman Demirel University, Türkiye duygugokce@sdu.edu.tr
**Department of Marketing and Advertising, Tarsus University, Türkiye onurtos@tarsus.edu.tr
***Independent Researcher, Türkiye harika.tos.91@gmail.com
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consumption, material use, waste generation and carbon emissions have become key performance areas that require systematic assessment (Hill & Bowen, 1997; McLennan, 2004; Zuo & Zhao, 2014; Allen et al., 2015; Kibert, 2022; Karimi et al., 2023).

During transformation processes, the green building approach and certification systems have been among the key tools enabling sustainability to become measurable, verifiable and comparable at the building level (Doan et al., 2017; Shan & Hwang, 2018). Systems such as LEED, BREEAM, DGNB, EDGE, Green Star and B.E.S.T. assess building performance against specific criteria in areas such as energy, water, materials, indoor environmental quality, transport and land use, but differ in terms of their scoring methods and the performance areas they prioritise (Ebert et al., 2012; Feijão et al., 2024). Among these systems, LEED stands out on an international scale due to its adaptability to different building types, as well as new and existing buildings. LEED- and BREEAM-certified buildings, meanwhile, present an important area of research for examining the practical implications of the sustainability approach in building construction (Zuo & Zhao, 2014; Shan & Hwang, 2018; Akşit & Baştanoğlu, 2021; Kibert, 2022; Akşar, 2025).

Research on green building certification systems in Türkiye has largely focused on theoretical comparisons of the systems, the nationwide distribution of certified buildings, or the examination of a specific building type (Uruk & Külünkoğlu-İslamoğlu, 2019; Deligöz et al., 2020; Akşar, 2025). Furthermore, there are few studies that jointly evaluate LEED- and BREEAM-certified buildings with different functions within the same urban context in terms of certification levels, credit categories and the sustainability strategies applied (Çillioğlu-Karademir & Dağ, 2021; Büyükünsal & Alıcı, 2023; Hashi & Kasapoğlu, 2023). This study compares different building types in Izmir, province of Türkiye, within a common analytical framework, revealing the areas of assessment in which the performance of certified buildings is concentrated and how sustainability strategies differ according to building function. Within this framework, it contributes a local-scale, comparative and multi-typology assessment to the literature.

2. Conceptual Framework

2.1. Sustainability

The concept of sustainability has gained prominence with the rise of industrialisation, rapid population growth, the over-exploitation of natural resources and the increasing visibility of environmental degradation; it has evolved into a fundamental approach demonstrating that development cannot be explained solely in terms of economic growth (Mebratu, 1998; Bozlağan, 2010). The most widely accepted definition of the concept was provided in the World Commission on Environment and Development's report entitled 'Our Common Future'; sustainable development is described as a form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). This definition positions sustainability not merely as an approach seeking solutions to environmental problems, but as a principle linked to intergenerational justice, the continuity of resources, and the ethical boundaries of development (WCED, 1987; Du-Pisani, 2006). However, the literature indicates that sustainability does not have a single, fixed definition, but is addressed with different priorities by various disciplines (Lélé, 1991; Gedik, 2020). According to Lélé (1991), although the concept is widely accepted, the tension between the environment and development is often not sufficiently clearly defined. Mebratu (1998), on the other hand, emphasises that the concept of sustainability has a multi-layered structure shaped at the intersection of environmental concerns, economic expectations and social needs.

Sustainability in Architecture: It is a holistic approach that requires consideration not only of a building's energy performance during its operational phase, but also of site selection, design, material selection, construction, use, maintenance and the post-life cycle (Hill & Bowen, 1997; Kibert, 2022). This approach redefines architecture as a discipline that, in addition to being a field of aesthetic and functional production, bears the responsibility of reducing environmental impacts, balancing resource consumption and enhancing user well-being (Sev, 2009; Korur, 2024). Akadiri et al. (2012) evaluate the fundamental components of sustainable architecture under the headings of resource conservation, cost-effectiveness and adaptation to human needs. Within this framework, sustainable architecture requires the integration of passive and active strategies, such as the use of high-energy-efficiency technical systems, climate-responsive design decisions, the utilisation of natural light, natural ventilation, water efficiency, and appropriate material selection (Sassi, 2006; Ateş-Can & Özipek, 2019).

Urban Sustainability: It is a multidimensional approach that requires urban development to be assessed not solely in terms of economic growth, but in conjunction with the objectives of environmental protection, social justice and liveability (Campbell, 1996; Jenks & Jones, 2010; Dilfiruz & Sevinç, 2025). This approach has evolved into a planning and management framework aimed at reducing the pressures generated by cities through their consumption of natural resources, land use, transport systems, infrastructure burden and social inequalities (Keleş, 1990; Newman & Kenworthy, 1999; Cohen, 2017). Consequently, a sustainable city is understood not only as a physical settlement that causes less harm to the environment, but also as an urban system in which access to services, the quality of public spaces, transport equity and social welfare are organised in a balanced manner (Campbell, 1996; Jenks & Jones, 2010; Kaya & Taylan-Susan, 2020).

2.2. Green Building

Green building is a comprehensive approach to sustainable construction that includes design, construction, operation, maintenance, and the end of the life cycle, even if it is a technical solution meant to lower energy consumption throughout the operational phase (McLennan, 2004; Kubba, 2017; Kibert, 2022). This approach aims to ensure the efficient use of energy, water and materials; to reduce waste and emissions; to consider the environmental impacts of land use; and to establish a balanced relationship between the building and its natural environment (Edwards, 2010; Zuo & Zhao, 2014; Kibert, 2022). Consequently, green building represents a multidimensional performance concept that requires the joint assessment of numerous criteria, including energy efficiency, indoor environmental quality, water management, material selection, waste management, resilience and life-cycle performance (McLennan, 2004; Kubba, 2017; Belek & Yamaçlı, 2023).

The literature makes clear that research into green buildings initially focused on environmental performance, energy efficiency and certification systems; over time, however, social, economic and user-centred dimensions have also come to the fore (Zuo & Zhao, 2014; Darko & Chan, 2016; Khan et al., 2019). Recent studies indicate that green buildings can make positive contributions to user health through indoor air quality, daylight, thermal comfort and general indoor environmental conditions (Allen et al., 2015; Wei et al., 2015; Karimi et al., 2023). However, economic feasibility, integrated design, managerial capacity and stakeholder collaboration are among the key factors influencing the widespread adoption of green building practices (Yudelson, 2009; Darko & Chan, 2017). The literature identifies the perception of high initial investment, lack of information, insufficient incentives, low market demand and regulatory gaps as the main barriers to green building practices (Dwaikat & Ali, 2016; Darko & Chan, 2017). In the Turkish literature, green building is defined as a multi-criteria building approach that considers both the environment and human health, and which must be addressed using sustainable criteria throughout the design, construction, use and demolition processes (Erdede & Bektaş, 2014; Bayat & Küçükali, 2022; Belek & Yamaçlı, 2023).

2.2.1. Green Building Certification Systems (LEED, BREEAM, EDGE, DGNB, Green Star, B.E.S.T.)

Green building certification systems are tools that assess the environmental performance, resource efficiency, occupant health and sustainability levels of buildings against specific criteria, making these aspects comparable and verifiable (Doan et al., 2017; Shan & Hwang, 2018). Although these systems provide a common framework for integrating sustainability principles into design, construction and operation processes, they differ in terms of their scoring methods, the performance areas they prioritise and their regional adaptations (Ebert et al., 2012; Feijão et al., 2024).

LEED is one of the most widely used systems internationally and assesses building performance across categories such as energy, water, materials, indoor environmental quality, transport and regional priorities (Shan & Hwang, 2018; Uruk & Külünkoğlu-Islamoğlu, 2019). BREEAM, as one of the oldest certification systems, assesses categories such as management, health and comfort, energy, transport, water, materials, waste, land use, ecology and pollution; it stands out for its weighting structure, which can vary depending on the building type and context (Doan et al., 2017). Comparisons within the Turkish context demonstrate that LEED and BREEAM assign different weights to energy, water and materials criteria; consequently, the same building may exhibit different strengths and weaknesses across the two systems (Deligöz et al., 2020).

Other systems, meanwhile, are distinguished by different sustainability priorities. The DGNB assesses economic, socio-cultural, functional, technical and process quality alongside ecological performance using a life-cycle approach (Ebert et al., 2012; Geçimli, 2021). EDGE focuses on energy, water and material-related embodied energy savings by offering a more accessible model, particularly for developing countries (Isimbi & Park, 2022). Green Star has evolved as an Australia-based assessment system covering the categories of management, indoor environmental quality, energy, transport, water, materials, land use and emissions (Doan et al., 2017; Dharmarathna et al., 2025). B.E.S.T., developed in Türkiye, is a system that takes into account local climate, legislation and implementation conditions; it provides a national assessment framework based on categories such as energy, water, materials, health and comfort, and living in the home (Deligöz et al., 2020; Geçimli, 2021). While these certification systems are united by the same sustainability objective, each reflects the priorities of its own geographical, economic and institutional context. Therefore, the choice of system should be made by taking into account the building type, project objective, cost expectations, local conditions and the performance areas to be assessed (Shan & Hwang, 2018; Feijão et al., 2024).

Table 1 shows the EDGE certification levels, Table 2 shows DGNB ratings scores, Table 3 shows the LEED Certification ratings, Table 4 shows the BREEAM certification ratings, Table 5 shows the Green Star ratings, and Table 6 shows the B.E.S.T. certification ratings.

Table 1 EDGE Certification Levels

EDGE Certified	EDGE Advanced	Zero Carbon
Over 20% savings on energy, water and materials	Over 40% energy savings	100% energy savings (carbon neutral)

Source: Adapted from the official EDGE certification criteria (EDGE, 2026)

Table 2 DGNB Rating Table

VALID	BRONZE	SILVER	PLATINUM
38,5 points or more	55 points or more	71,5 points or above	88 points or more

Source: Adapted from the official DGNB rating criteria (DGNB, 2026)

Table 3 LEED Certification Rating Table

Platinum 80+ Points	Gold 60-79 Points	Silver 50-59 Points	Certified 40-49 Points

Source: Adapted from the LEED rating system (USGBC, 2026)

Table 4 BREEAM Certification Rating Table

BREEAM Pass	BREEAM Good	BREEAM Very Good	BREEAM Excellent	BREEAM Outstanding
1 Star	**2 Star**	**3 Star**	**4 Star**	**5 Star**
>=30	>=45	>=55	>=70	>=85

Source: Adapted from the official BREEAM rating benchmarks (BREEAM, 2026)

Table 5 Green Star Rating Table

1 Star	2 Star	3 Star	4 Star	5 Star	6 Star
10 – 19 points	20 – 29 points	30 – 44 points	45 – 59 points	60 – 74 points	75 points and above

Source: Adapted from the official Green Star rating criteria (USGBC, 2026)

Table 6 B.E.S.T. Certification Rating Table

Approved	Good	Very good	Perfect
46 – 64 points	65 – 79 points	80 – 99 points	100 – 110 points

Source: Adapted from the B.E.S.T. certification criteria (ÇEDBİK, 2026)

3. Literature Review

In the international literature, green building certification systems have largely been examined comparatively in terms of assessment methods, credit categories and sustainability dimensions. These studies demonstrate that systems such as LEED, BREEAM, CASBEE and Green Star assign different weights to categories such as energy, water, materials, indoor environmental quality, transport and management; furthermore, they share a common objective of making the sustainability performance of buildings measurable and comparable (Doan et al., 2017; Shan & Hwang, 2018). A study conducted within the European context, meanwhile, reveals that certification systems not only serve as technical assessment tools but also provide multi-criteria decision-making frameworks in which environmental, economic and managerial priorities vary according to regional conditions (Sánchez-Cordero et al., 2020). In this respect, certification systems are regarded as important tools that guide decision-making processes in the sustainable architecture and construction sector (Shan & Hwang, 2018; Sánchez-Cordero et al., 2020).

Some of the studies conducted in Türkiye on green buildings and certification systems examine the prevalence of international systems—particularly LEED—across the country, their distribution by building type, and trends in their implementation (Çillioğlu-Karademir & Dağ, 2021; Akşar, 2025). Other studies, meanwhile, compare certification systems such as BREEAM, LEED and B.E.S.T. in terms of their energy, water and material criteria, as well as the weightings assigned to these criteria (Uruk & Külünkoğlu-Islamoğlu, 2019; Deligöz et al., 2020; Akşar, 2025). Within this framework, it is evident that the Turkish literature has largely focused on the theoretical comparison of certification systems and the determination of the general distribution of certified buildings; however, it has devoted limited attention to the joint evaluation of certified projects with different functions implemented at a local-scale.

The literature also includes studies focusing on specific building types or credit categories. Hashi and Kasapoğlu (2023), who assessed LEED-certified office buildings in Türkiye in terms of sustainable material and resource use, found that even in projects with high certification levels, performance in certain credit categories could be limited. Karaer and Kömürlü (2025), who examined LEED Gold-certified hotel buildings, sought to identify building-type-specific patterns by comparing scores obtained by category and common sustainability features. By examining the certification process through the lens of implementation experience, Büyükünsal and Alıcı (2023) demonstrate that these systems should be evaluated not merely as scoring tools, but as processes related to knowledge levels, stakeholder awareness and implementation capacity. Similarly, Darko and Chan (2017) note that knowledge gaps, costs, insufficient incentives, low demand and regulatory gaps are the main factors limiting the widespread adoption of green building practices.

It is evident that studies in the literature have primarily focused on the theoretical comparison of certification systems, determining the nationwide distribution of certifications in Türkiye, and examining a single building type or credit category (Deligöz et al., 2020; Akşar, 2025; Karaer & Kömürlü, 2025). Furthermore, there are few studies that jointly evaluate certified buildings with different functions within a specific city in terms of their certification levels, credit categories and sustainability strategies. The scarcity of research comparing different typologies—such as residential, office, hotel, commercial, industrial, data centre and transport buildings—within the same urban context is striking (Deligöz et al., 2020; Çillioğlu-Karademir & Dağ, 2021; Hashi & Kasapoğlu, 2023). Building on this gap, this study evaluates LEED- and BREEAM-certified buildings in Izmir using a multi-typology sample; it examines not only the numerical distribution of certified buildings but also the credit categories where sustainability performance is concentrated, as well as the strategies that vary according to building function.

4. Materials and Methods

Examining the sustainability performance of green-certified buildings in Izmir province in terms of their certification levels, assessment criteria/credit categories, and environmental initiatives put in place is the goal of the current study. To this end, a qualitative research approach was adopted and document analysis was used as the data collection technique. According to Yıldırım and Şimşek (2021), document analysis is considered a method that enables the systematic collection, examination, classification and interpretation of written and visual materials related to the research topic. Existing documents pertaining to green building-certified projects in Izmir were also screened, assembled, and brought together for comparative analysis in this study. The certification records and publicly available project documents used in the research were last checked on 23 May 2026, and the data collection process was completed on that date. By examining the green building database of the Çevre Dostu Yeşil Binalar Derneği (ÇEDBİK, 2026), information on LEED, BREEAM, EDGE and DGNB certified buildings was obtained. Within this framework, the study also includes information on the current distribution of LEED and BREEAM certifications in Türkiye.

ÇEDBİK (2026) report was examined, and research based on the database revealed that there are n=675 LEED-certified buildings, n=83 with BREEAM certification, and n=3 with EDGE certification in Türkiye. However, following the investigations, it was determined that only LEED and BREEAM certification records exist in the city of Izmir. Buildings with EDGE and DGNB certification, however, are not present in the city of Izmir (EDGE, 2026). The U.S. Green Building Council's (2026) LEED Project Directory database lists 32 completed LEED-certified projects in Izmir. The BREEAM (2026) Explore database, meanwhile, contains a total of four certification records associated with three separate projects or physical structures, two of which relate to different sections of the same building. In this context, the research data consists of compiled project information relating to LEED-certified projects in Izmir and BREEAM certification records. For LEED projects, scorecards, certification levels, total scores, credit categories, building functions and the sustainability strategies outlined in the project descriptions were examined. Under the BREEAM framework, the assessment scheme, rating, certificate code, assessor details, project or section description and available operational performance statements were compiled The projects covered by the study encompass a range of functions, including offices, residential buildings, shopping centres, industrial buildings, data centres, retail outlets, petrol stations, campus buildings and airport terminals. For LEED projects, scores relating to the categories of Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation and Regional Priority were recorded; information contained in the project descriptions—such as energy and water savings, material usage, indoor air quality and renewable energy applications—was also included in the dataset. In the case of BREEAM records, however, due to the more limited availability of publicly accessible data, the analysis was restricted to existing ratings, certificates and project descriptions.

Four stages were included in the data gathering method for this study, which was based on document review. In the first stage, the conceptual and theoretical framework of the study was established by reviewing the literature on sustainability, sustainability in architecture and urban planning, the concept of green buildings, and green building certification systems, particularly LEED and BREEAM. In the second stage, project documents, scorecards, project descriptions, certification codes, assessment systems and plan information relating to LEED and BREEAM-certified projects in Izmir were compiled. In the third stage, the data obtained was classified based on project name, building type, certification level, total score, credit categories and assessment criteria. In the fourth stage, the classified data was analysed comparatively to determine in which credit categories LEED and BREEAM certification records in Izmir are concentrated, which sustainability strategies are prominent in which building types, and how the distribution varies according to certification levels. This phased approach aligns with the steps in the document review process outlined by Sığrı (2021)—namely, accessing materials, classifying materials, preparing data for analysis, and ensuring its suitability for use in the research report—as well as with the explanatory and methodological framework. This contributes to the diversity of data in the research. To enable the systematic interpretation of data obtained through document analysis and to test the study's objectives more clearly, the following research questions have been formulated:

1) Which green building certification schemes are represented in Izmir, and what is the breakdown of LEED-certified projects and BREEAM certification records in terms of their number and certification outcome?

2) What are the certification levels of LEED-certified buildings in Izmir, the distribution of points across credit categories, and the key sustainability strategies?

3) What are the ratings of the BREEAM certification records in Izmir, the project or section characteristics, and the key sustainability and operational strategies?

4) What similarities and differences are evident between LEED-certified projects in Izmir and BREEAM certification records in terms of assessment areas, key performance patterns and sustainability strategies that vary according to building function?

5) Based on the findings, what recommendations can be made for the development of green building practices in Izmir?

The sample for the study was determined using a criterion-based purposive sampling approach. According to Creswell and Poth (2024), purposive sampling enables the deliberate selection of cases that are directly relevant to the research objectives and rich in information. Projects were included in the study provided they met the following criteria:

- They must be situated within the geographical boundaries of Izmir,
- They must have a completed and verifiable LEED or BREEAM certification record in the relevant official certification database as at 23 May 2026
- Publicly available project information must be available that allows the project name, location, certification system or level, and the building's function to be identified.

Projects located outside Izmir, applications without a completed and verifiable certification record, and records that did not contain the minimum information required for classification at project level were excluded from the study. EDGE and DGNB-certified projects were also screened; however, as no verifiable completed project records for these systems could be identified in Izmir as of the final data collection date, they were not included in the analysis dataset. As a result of these criteria, the research dataset was composed of LEED-certified projects with different functions and BREEAM certification records. The basic unit of analysis for the study is a project or project section represented by a separate record in the official certification databases. Under the LEED framework, each certified project was treated as a separate unit of analysis. Under BREEAM, each certification record listed separately in the database was accepted as an analysis unit, and certification records relating to different sections of the same physical structure were examined as separate records. However, when interpreting the findings, the distinction between the certification record and the independent physical structure was maintained.

In the analysis of the data, a descriptive statistical analysis method was employed first. Healey (2014) defines descriptive statistics as the process of interpreting data using tools such as frequency, ratios, percentages and measures of central tendency, with the aim of identifying the fundamental characteristics of a dataset. According to Büyüköztürk et al. (2020), this method plays a fundamental role, particularly in simplifying and making large-scale datasets more interpretable. Within this framework, as part of the descriptive statistical analysis, the types of certificates, certificate levels, score ranges and building types for the projects were organised into tables and the current situation was presented. The second method used in the research is comparative content analysis. According to Krippendorff (2018), content analysis is defined as a research technique aimed at making valid and repeatable inferences from texts. Within this scope, the comparative content analysis utilised in this study identified prominent trends between credit categories and assessment headings; project patterns were evaluated under headings such as energy and atmosphere, water efficiency, materials and resources, indoor environmental quality, and location/transport. In this context, the sustainability performance of buildings with different functions located in the same city was examined under common headings, and the similarities and differences between building types were interpreted. Assessment data from LEED scorecards and BREEAM projects formed the basis of this comparative analysis. The combined use of two analytical methods in the study contributes to validity and reliability. Furthermore, to enhance validity and reliability, data sources were diversified as much as possible, and scores, certification levels and sustainability strategies relating to the same project were compared across different documents. In addition, project data were reorganised under common headings for analysis. As the dataset contains projects certified under different LEED versions, assessment schemes and building functions, the projects' absolute total scores have not been compared directly as equivalent performance indicators. The total scores have been used to describe each project's position within its own certification level and the relevant assessment system. Comparisons between projects were primarily conducted on the basis of performance distributions across credit categories, prominent sustainability strategies, and common or differing patterns observed across building functions. However, no one-to-one score mapping was carried out between the LEED and BREEAM systems; the comparison was conducted on the basis of common performance areas and sustainability practices defined in the certification schemes.

5. Findings

5.1. General Characteristics of the Sample According to Its Structural Functions

It can be seen that the LEED-certified projects and BREEAM certification records examined as part of the research are distributed across different building functions. The sample covers a range of different uses, including office buildings, petrol stations, industrial facilities, shops, shopping centres, data centres, residential projects, campus buildings and airport terminals. This diversity demonstrates that green building practices in Izmir are not limited to a single building type but are spread across building functions of varying scales.

5.2. Breakdown of LEED-Certified Projects by Year and Certification Level

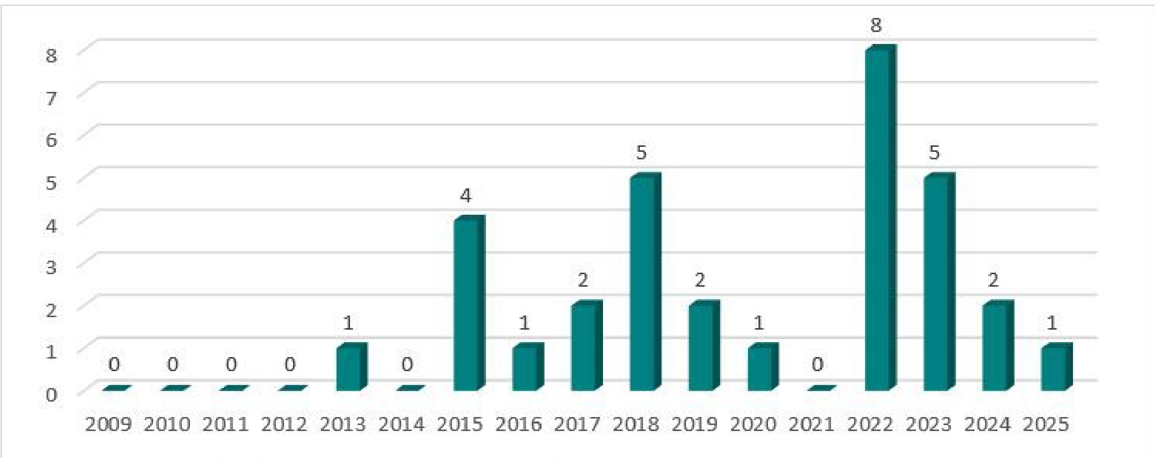


Figure 1 Distribution of LEED-certified projects in Izmir by certification year

Source: Prepared by the authors based on data obtained from the LEED Project Directory (USGBC, 2026)

Figure 1 shows the distribution of LEED-certified projects in Izmir by year of certification. It can be seen that the highest number of LEED certifications took place in 2022 (n=8). This year is followed by 2018 (n=5) and 2023 (n=5). The distribution by year does not show a regular and continuous upward trend; the number of certifications fluctuates between periods. The dataset examined contains a total of 32 completed LEED-certified projects.

Table 7 Distribution of LEED-Certified Projects by Year and Certification Level

Years	Certified	Silver	Gold	Platinum	Total
2009	-	-	-	-	-
2010	-	-	-	-	-
2011	-	-	-	-	-
2012	-	-	-	-	-
2013	-	-	1	-	1
2014	-	-	-	-	-
2015	-	2	2	-	4
2016	-	1	-	-	1
2017	-	-	2	-	2
2018	-	-	5	-	5
2019	-	-	2	-	2
2020	-	-	1	-	1
2021	-	-	-	-	-
2022	1	2	3	2	8
2023	-	2	2	1	5
2024	-	-	2	-	2
2025	-	-	1	-	1
Total	1	7	21	3	32

Source: Prepared by the authors based on the LEED Project Directory (USGBC, 2026)

Table 7 shows the distribution of LEED-certified buildings in the city of Izmir by year and certification level. According to this, there are a total of 32 LEED-certified buildings in Izmir. Among the certification levels, Gold-certified projects account for the largest share (n=21). The Gold certification level is followed by Silver (n=7) and Platinum (n=3), while only one project is at the Certified level. This distribution shows that the majority of LEED projects in the sample under review exceed the minimum certification level, and that the Gold level is the predominant category.

Table 8 presents information on LEED-certified projects in Izmir, including the approval date, project name, certification level, assessment system, project size and total score. The projects listed in the table encompass a range of different functions, such as offices, residential buildings, industrial facilities, commercial buildings, data centres, retail premises and transport buildings. This diversity demonstrates that LEED certification in Izmir is not limited to a specific building type but is applicable across different scales and usage areas. Furthermore, the inclusion of LEED applications not only for newly constructed projects but also for the operation and use of existing buildings highlights that the sustainability approach in the city is developing through both new construction and the performance of existing buildings.

Table 8 Data on LEED-Certified Projects in Izmir

Project Approval Date	Project	Certificate Level	Assessment System	Project Size	Points
14.10.2025	Cetas Izmir Plaza	Gold	LEED O+M: Existing Buildings . v4.1 - LEED v4.1	15.100 m²	68
22.04.2024	ING Bank Turkey, Izmir Regional Office	Gold	LEED O+M: Existing Buildings . v4.1 - LEED v4.1	28.497 ft²	67
12.09.2024	DB Agricultural Energy Office Building	Gold	LEED BD+C: New Build . v4 - LEED v4	955 m²	68
24.01.2023	Opet Petrol Station – Foça West Station	Gold	LEED O+M: Existing Buildings . v4.1 - LEED v4.1	411 m²	71
24.01.2023	Opet Petrol Station – Foça East Station	Gold	LEED O+M: Existing Buildings . v4.1 - LEED v4.1	411 m²	72
3.10.2023	Camyapi Factory	Silver	LEED BD+C: New Build . v4 - LEED v4	22.026 m²	52
30.10.2023	Pinar Et Administration Building	Platinum	LEED O+M: Existing Buildings . v4.1 - LEED v4.1	886 m²	80
29.10.2023	Packaging Factory	Silver	LEED BD+C: New Build . v4 - LEED v4	18.575 m²	54
17.01.2022	Puratos – Efes	Silver	LEED BD+C: New Build . v4 - LEED v4	9.188 m²	52
21.01.2022	Izmirgaz Head Office Building	Silver	LEED BD+C: New Build . v4 - LEED v4	79.201 m²	55
30.03.2022	Arçelik Sustainable Store	Platinum	LEED ID+C: Retail . v4 - LEED v4	860 m²	84
04.04.2022	JTI Minced Meat Packaging Plant	Gold	LEED BD+C: New Build . v4 - LEED v4	782 m²	61
29.04.2022	Lansinoh Izmir Factory	Gold	LEED O+M: Existing Buildings . v4 - LEED v4	8.198 m²	67
2.08.2022	Ck Design Studio	Platinum	LEED BD+C: New Build . v4 - LEED v4	440 m²	80
4.10.2022	Kocaer Çelik A.Ş. Galvanising Plant	Gold	LEED BD+C: New Build . v4 - LEED v4	6.810 m²	63
26.10.2022	UPS Izmir Distribution Centre	Certified	LEED BD+C: New Build . v3 - LEED 2009	6.237 m²	45
19.05.2020	Izmir Karşıyaka Shopping Centre	Gold	LEED BD+C: Kernel and Shell. v3 - LEED 2009	102.258 m²	60
9.01.2019	Turkcell Izmir Data Centre	Gold	LEED BD+C: New Build . v3 - LEED 2009	11.412 m²	70
7.08.2019	Mistral Towers Residences	Gold	LEED BD+C: Kernel and Shell . v3 - LEED 2009	299.552 ft²	67
10.02.2018	Park Yaşam Ataşehir – Block A	Gold	LEED BD+C: New Build . v3 - LEED 2009	53.333 ft²	61
10.02.2018	Park Yaşam Ataşehir – Block B	Gold	LEED BD+C: New Build . v3 - LEED 2009	71.059 ft²	62
10.04.2018	Izmir Chamber of Commerce	Gold	LEED BD+C: New Build . v3 - LEED 2009	13.029 m²	70
26.04.2018	Allianz Izmir Operations Centre	Gold	LEED BD+C: New Build . v3 - LEED 2009	16.496 m²	68
11.09.2018	Mistral Towers Offices	Gold	LEED BD+C: Kernel and Shell . v3 - LEED 2009	434.255 ft²	71
17.01.2017	Hilton Garden Inn Izmir Bayraklı	Gold	LEED BD+C: New Build . v3 - LEED 2009	117.492 ft²	67
16.10.2017	T. Garanti Bank Karşıyaka Office Building	Gold	LEED BD+C: New Build . v3 - LEED 2009	8.619 ft²	75
17.02.2016	Soyak Siesta Blue	Silver	LEED BD+C: New Build . v3 - LEED 2009	227.606 ft²	53
26.02.2015	Soyak Mavişehir Optimus First	Gold	LEED BD+C: New Build . v3 - LEED 2009	714.210 ft²	64
30.03.2015	Soyak Mavısehır Optimus Gold	Gold	LEED BD+C: New Build . v3 - LEED 2009	372.303 ft²	63
18.08.2015	Ever Ramada Encore Hotel	Silver	LEED BD+C: New Build . v3 - LEED 2009	120.638 ft²	53
24.12.2015	Izmir Adnan Menderes Airport Terminal	Silver	LEED BD+C: New Build . v3 - LEED 2009	2.071.837 ft²	56
15.04.2013	Alaçatı Macrocenter	Gold	LEED O+M: Existing Buildings . v3 - LEED 2009	14.646 ft²	65

Source: Compiled by the authors from the LEED Project Directory (USGBC, 2026)

Table 9 Comparison of LEED-Certified Projects by Credit Category

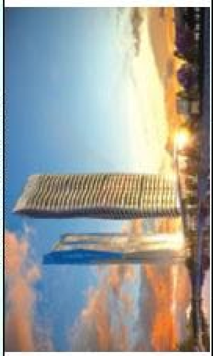
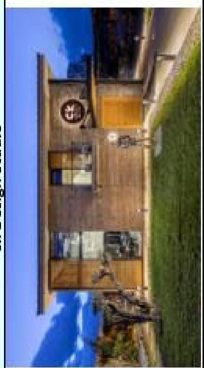
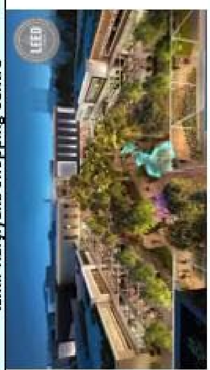
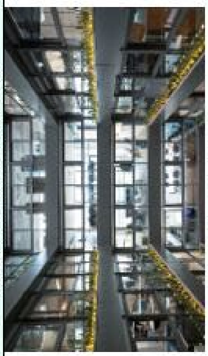
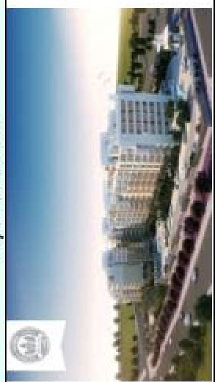
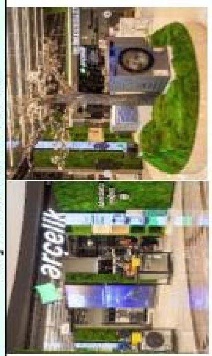
LEED Scorecard Table										
Project Name	Integrative Process Credits	Location and Transport	Sustainable Areas	Water Efficiency	Energy and the Atmosphere	Materials and Resources	Indoor Environmental Quality	Regional Priority Loans	Innovation	Point
Cetas Izmir Plaza		12/14	1/4	6 / 15	23 / 35	7 / 9	19 / 22		0 / 1	Gold 68/100
ING Bank Turkey, Izmir Regional Office		13 / 14	0 / 4	10 / 15	22 / 35	7 / 9	14 / 22		1 / 1	Gold 67/100
DB Agricultural Energy Office Building	1 / 1	3 / 20	10/10	9 / 11	27 / 89	3 / 13	6 / 16	4 / 4	5 / 6	Gold 68/ 100
Opet Petrol Station – Foça West Station		13/14	2/4	6/15	27/35	3/9	21/22		0/1	Gold 72/100
Opet Petrol Station – Foça East Station		13/14	2/4	6/15	26/35	3/9	21/22		0/1	Gold 71/100
Camyapi Factory	0 / 1	4 / 20	7 / 10	9 / 11	15 / 89	3 / 13	5 / 16	4 / 4	5 / 6	Silver 52/110
Pinar Meat Administration Building		11/14	2/4	11/15	30/35	7/9	18/22		1/1	Platinum 80/100
Packaging Factory	1 / 1	3 / 20	5 / 10	9 / 11	23 / 89	2 / 13	2 / 16	4 / 4	5 / 6	Silver 54/110
Puratos – Efes	1 / 1	2 / 20	1 / 10	8 / 11	24 / 89	2 / 13	5 / 16	4 / 4	5 / 6	Silver 52/110
Izmirgaz Head Office Building	1 / 1	10 / 20	5 / 10	10 / 11	12 / 89	3 / 13	6 / 16	3 / 4	5 / 6	Silver 55/110
Arçelik Sustainable Store	2/2	18/20		8/12	28/81	8/14	11/16	4/4	5/6	Platinum 84/110
JTI Minced Meat Packaging Plant	1 / 1	3 / 20	5 / 10	10 / 11	22 / 89	3 / 13	8 / 16	3 / 4	6 / 6	Gold 61/110
Lansinoh Izmir Factory		15/20	9/10	9/12	17/56	5/8	5/17	4/4	3/6	Gold 67/110
Ck Design Studio	1/1	8/20	7/10	9/11	26/89	8/13	11/16	4/4	6/6	Platinum 80/110
Kocaer Steel Ltd. Galvanising Plant	0/1	8/20	4/10	8/11	25/89	3/13	6/16	5/6	4/4	Gold 63/110
UPS Izmir Distribution Centre			15/26	10/10	6/53	4/14	3/15	3/4	4/6	Certified 45/110
Izmir Karşıyaka Shopping Centre			21/28	8/10	12/55	6/13	6/12	3/4	4/6	Gold 60/110

Project Name	Integrative Process Credits	Location and Transport	Sustainable Areas	Water Efficiency	Energy and the Atmosphere	Materials and Resources	Indoor Environmental Quality	Regional Priority Loans	Innovation	Point
Turkcell Izmir Data Centre			16/26	10/10	22/53	6/14	9/15	4/4	3/6	Gold 70/110
Mistral Towers Residences			25/28	10/10	15/55	6/13	7/12	4/4	5/6	Gold 71/110
Park Yaşam Ataşehir – Block A			21/26	8/10	10/53	6/14	8/15	3/4	5/6	Gold 61/110
Park Yaşam Ataşehir – Block B			23/26	8/10	9/53	6/14	8/15	3/4	5/6	Gold 62/110
Izmir Chamber of Commerce			19/26	8/10	22/53	7/14	8/15		6/6	Gold 70/110
Allianz Izmir Operations Centre			21/26	8/10	15/53	5/14	10/15	4/4	5/6	Gold 68/110
Mistral Towers Offices			25/28	10/10	14/55	6/13	7/12	4/4	5/6	Gold 71/110
Hilton Garden Inn Izmir Bayraklı			21/26	10/10	18/53	4/14	5/15	3/4	6/6	Gold 67/110
Garanti Bank Karşıyaka Office Building			20/26	6/10	24/53	5/14	12/15	4/4	4/6	Gold 75/110
Soyak Siesta Blue			19 / 26	4 / 10	12 / 53	5 / 14	7 / 15	2 / 4	4 / 6	Silver 53/110
Soyak Mavişehir Optimus First			20/26	6/10	14/53	6/14	8/15	4/4	6/6	Gold 64/110
Soyak Mavısehır Optimus Gold			20/26	6/10	13/53	6/14	8/15	4/4	6/6	Gold 63/110
Ever Ramada Encore Hotel			22 / 26	8 / 10	7 / 53	6 / 14	5 / 15	2 / 4	3 / 6	Silver 53/110
Izmir Adnan Menderes Airport Terminal			20 / 26	8 / 10	7 / 53	8 / 14	5 / 15	2 / 4	6 / 6	Silver 56/110
Alaçatı Macrocenter	0/2		17/26	5/14	27/35	5/10	2/15	3/4	4/6	Gold 63/110

Source: Compiled by the authors from the project scorecards available in the LEED Project Directory (USGBC, 2026)

Table 9 presents a comparison of LEED-certified buildings in the city of Izmir by scorecard and credit category. Table 10 shows examples of images from LEED-certified buildings located in the city of Izmir. The examples include images of the exterior architectural design for some projects and the interior architectural design for others.

Table 10 Examples of LEED-Certified Projects in Izmir

DB Agricultural Energy Office Building	Opet Petrol Station – Foça West/East Station	Pinar Meat Administration Building	Mistral Towers Offices
			
Puratos – Efes	Lansinoh Izmir Factory	Ck Design Studio	Park Yaşam Ataşehir – Block A
			
Kocaer Steel Ltd. Galvanising Plant	Izmir Karşıyaka Shopping Centre	Turkcell Izmir Data Centre	Izmir Chamber of Commerce
			
Allianz Izmir Operations Centre	Soyak Siesta Blue	Izmir Adnan Menderes Airport Terminal	Arçelik Sustainable Store
			

5.2.1. LEED Credit Categories and Sustainability Strategies Based on Building Functions

When LEED-certified buildings in Izmir are assessed by credit category, it is evident that sustainability performance is concentrated particularly in the areas of energy and water efficiency, indoor environmental quality, site and transportation, and sustainable sites. In contrast, the materials and resources category is represented to a more limited extent in many projects. This distribution indicates that, within the Izmir sample, LEED success has strengthened in certain performance areas, whilst developing in a more selective manner in other categories.

Energy and Water Performance: The areas of strongest performance in LEED-certified buildings in Izmir are energy and water efficiency. The Pınar Et Administrative Building, the DB Agricultural Energy Office Building, the OPET Foça East and West Stations, the Turkcell Izmir Data Centre and certain large-scale commercial buildings stand out in these categories. The recurrence of strategies such as the use of renewable energy, energy modelling, efficient mechanical systems, low-consumption lighting fixtures, rainwater harvesting and greywater reuse in project descriptions demonstrates that LEED performance in the Izmir sample has largely become visible through measurable energy and water savings.

Indoor Environmental Quality, Location, Transport and Sustainable Sites: The categories of indoor environmental quality, location, transport and sustainable sites are key themes in LEED projects in Izmir, both from a user-centred perspective and at an urban scale. In projects such as the OPET Foça stations, the Arçelik Sustainable Store, the Izmir Chamber of Commerce, the Allianz Izmir Operations Centre and the Hilltown Karşıyaka Shopping Centre, indoor air quality, thermal comfort, use of natural light, user control, access to public transport, cycling facilities and alternative transport solutions are all notable features. These findings demonstrate that LEED applications focus not only on environmental performance but also on user health, comfort, accessibility and the urban context.

The Relatively Limited Representation of the Materials and Resources Category: While the materials and resources category is not entirely excluded from LEED projects in Izmir, it appears to be a more limited area of performance compared to the energy and water categories. The Arçelik Sustainable Store, CK Design House, the Izmir Chamber of Commerce and some residential projects highlight the use of recycled materials, the preference for local materials, repurposing and waste management practices. However, the fact that this category is represented by lower scores across most projects on the scorecard indicates that the 'Materials and Resources' category does not translate into the main category determining certification success in every project.

Sustainability Strategies Varying by Building Type: LEED-certified buildings in Izmir differ in terms of their sustainability strategies depending on the type of building. While energy efficiency, user comfort, indoor environmental quality and urban accessibility are prioritised in office and administrative buildings; in industrial buildings, energy management, water efficiency, waste control, sub-metering and operational efficiency are key. In commercial buildings and retail premises, user access, visible environmental initiatives and indoor environment quality are prioritised; whereas in residential projects, quality of life, natural lighting, water conservation, the use of low-emission materials and a healthy indoor environment take centre stage. In specialised structures such as data centres and airport terminals, sustainability is linked to large-scale energy, water and waste management, technical reliability and operational continuity. Consequently, in the Izmir sample, LEED applications do not produce a uniform sustainability model; instead, they are shaped around different priorities depending on the building's function.

The findings from the analyses in this section show that the sustainability performance of LEED-certified buildings in Izmir is concentrated particularly in the areas of energy and water efficiency, indoor environmental quality, and location and transport. Furthermore, it is evident that sustainability strategies vary according to building type, with different priorities emerging in office, industrial, commercial and residential buildings.

5.3. Findings Regarding BREEAM Certification Records in Izmir

Table 11 BREEAM Certification Details for the Karşıyaka Hiltown Shopping Centre

Karşıyaka Hilltown Shopping Centre (2024)	
Certificate	BIU00020995-1.0
Assessment	Superior %85.1
Plan	In Use: International Trade V6
	- Year of Completion: October 2019 - Location: Izmir, Turkey - Number of shops: 220 - Area/Capacity: 64,000 m² - Selected as the world's best project at the ICSC 2021 Global Design and Development Awards. - BREEAM In-Use 'Outstanding Achievement Award' – Commercial 6 Version, 2024

Source: Compiled by the authors from the official Hilltown Karşıyaka project documentation (Hiltown Karşıyaka, 2026)

Table 11 provides details of the BREEAM certification for the Karşıyaka Hiltown shopping centre.

Table 12 BREEAM Certification Details for the Izmir Optimum Shopping Centre

Izmir Optimum Shopping Centre	
Evaluator	Turkeco Consultancy
Certificate	BIU00003568-2.0
Assessment	Superior %86.0
Plan	In Use: International Trade V6
	- Following the update of the existing BREEAM In-Use Certificate to Commercial Version 6, İzmir Optimum Shopping Centre has been recognised as the first building in Turkey to hold this certificate. - The implementation of the ISO 14001 Environmental Management System ensures that the building's environmental performance is improved and that its environmental impact is reduced. - Annual improvement and development targets are set to achieve energy and water savings and reduce waste generation. Sustainable procurement is ensured through the environmental/sustainable procurement policy in place. - As part of new energy-saving strategies for outdoor lighting, energy consumption is reduced by ensuring that specific areas are lit only when necessary. - As part of occupational health and safety measures, accredited third-party organisations carry out annual measurements of indoor and outdoor lighting, thermal comfort, ambient noise and CO (carbon monoxide) levels, thereby creating healthy and comfortable indoor environments. Within this framework, visitors are provided with a better and healthier environment in which to spend their time.

Source: Compiled by the authors from the official project documentation of Rönesans Holding (2024)

Table 12 shows the BREEAM certification details for the Izmir Optimum shopping centre.

Table 13 Certification Details for the BREEAM Certificates Held by the Building

Altensis Construction and Energy Ltd.		
	Chapter 1	Chapter 2
Evaluator	Altensis Construction and Energy Ltd.	Altensis Construction and Energy Ltd.
Certificate	BIU00022847-1.0	BIU00022847-1.0
Assessment	Good %45.0	Good %53.3
Plan	In Use: International Trade V6	In Use: International Trade V6
	- Floor Area: 8,216 m² Accessibility, indoor comfort and user safety conditions within the building have been assessed in detail. Accordingly, existing facilities—such as changing rooms, showers, lockers, access provisions for disabled users and pedestrian safety measures—have been carefully examined, and improvements have been meticulously implemented where deemed necessary. - As part of the project, the building management's waste management and recycling policies, as well as its procurement processes for environmentally friendly materials and products, have been reviewed in detail. - Monthly and annual electricity and water consumption data for the building were analysed to identify potential areas for improvement aimed at enhancing energy and resource efficiency. - This comprehensive assessment aims to minimize the building's environmental impact whilst enhancing the comfort of its occupants.	

Source: Compiled by the authors from Altensis project documentation and the BREEAM Explore database (Altensis, 2026)

Table 13 presents details of the BREEAM certificates held for the Altensis Construction Energy Ltd. building. Two separate sections of the Altensis Construction Energy Ltd. building have been awarded BREEAM certificates. Information regarding the BREEAM certificates for Sections 1 and 2 is provided.

5.3.1. An Assessment of BREEAM Ratings and Operational Sustainability Strategies

As part of the research, 32 completed LEED-certified projects in Izmir and four BREEAM certification records associated with three separate projects or physical structures were identified. As two of the BREEAM records relate to different sections of the same building, this figure is not interpreted as representing four independent physical buildings. The official records examined indicate that LEED is a more widespread certification scheme in Izmir compared to BREEAM. This distribution indicates that LEED has a more widespread application in green building certification in Izmir, while BREEAM offers a stronger presence in specific projects, albeit on a more limited scale. BREEAM projects particularly stand out in areas such as the operational performance of existing buildings, environmental management, energy and water conservation, waste reduction, sustainable procurement, user comfort and safety.

The fact that Izmir Optimum Shopping Centre has been rated ‘Excellent’ demonstrates that it has delivered a strong performance under the BREEAM In-Use framework, through its operational processes, ISO 14001 environmental management, energy and water saving targets, outdoor lighting strategies and measurements of indoor environmental quality. In the case of Altensis/CEVA Logistics in Izmir, the “Good” rating highlights practices such as accessibility, indoor comfort, user safety, waste management, environmentally friendly procurement processes, and the monitoring of electricity and water consumption. However, data on BREEAM certification data are more limited and general in nature compared to LEED projects. While detailed point distributions by credit category are available for LEED projects, assessments of BREEAM projects are typically based on the assessment level, certification code, plan information and project descriptions. Consequently, in the Izmir sample, BREEAM findings are evaluated primarily in terms of operational performance, environmental management practices and user-focused improvement strategies, rather than detailed credit scores.

5.4. A Comparison of LEED and BREEAM-Certified Green Buildings in the City of Izmir

When green building examples in Izmir are evaluated together, it is evident that there are significantly more LEED-certified buildings than BREEAM-certified ones. Within the scope of this study, 32 LEED-certified buildings were identified in Izmir, compared to 4 BREEAM certification records. This distribution indicates that LEED has a more widespread application in the Izmir sample. This finding is consistent with LEED’s international visibility and prevalence in Türkiye (Doan et al., 2017; Shan & Hwang, 2018; Deligöz et al., 2020; Akşar, 2025).

One of the key differences between LEED and BREEAM is the level of data available. While BREEAM projects usually only provide the overall assessment level, certification code, assessment plan, and project descriptions, LEED projects offer comprehensive data, including certification level, assessment system, project size, total score, and the distribution of points across credit categories. Consequently, while LEED projects can be compared in greater detail based on credit categories, BREEAM projects are assessed primarily through operational processes, overall performance levels, and sustainability practices highlighted in the project descriptions.

In terms of performance areas, LEED projects tend to focus on energy and atmosphere, water efficiency, indoor environmental quality, location and transport, and sustainable sites, while the materials and resources category is relatively under-represented. In BREEAM projects, however, sustainability is more evident through existing building performance, environmental management, energy and water conservation, waste control, user comfort, safety and sustainable operational practices. From this perspective, while LEED offers a broader distribution across new building construction and different building typologies in the Izmir sample, BREEAM creates a more limited yet complementary assessment area, focusing particularly on the operational performance and management processes of existing commercial buildings.

6. Discussion

The findings of this study indicate that sustainability practices in LEED- and BREEAM certification records in Izmir are not limited to isolated and exceptional examples, but rather exhibit a pattern that extends across different building types and has reached a certain level of maturity. This result is consistent with studies (Çillioğlu-Karademir & Dağ, 2021; Akşar, 2025) that demonstrate the increasing prevalence of LEED-certified projects in Türkiye over time and their emergence across different building types. The predominance of the Gold certification level in the Izmir case study indicates that the sustainability approach is being addressed not only in terms of minimum compliance but also with higher performance targets.

One of the most striking aspects of the findings is that the categories of energy, atmosphere and water efficiency emerged as the areas of strongest performance in the projects. This aligns with the studies by Doan et al. (2017) and Shan and Hwang (2018), which emphasise that green building certification systems employ an evaluation logic that makes measurable environmental outcomes—particularly regarding energy and resource consumption—visible. Furthermore, green building research indicates that energy efficiency, water conservation and operational performance are among the most visible and widespread dimensions of the sustainable building discourse (Zuo & Zhao, 2014; Li et al., 2021; Kibert, 2022). In the case of Izmir, the prominence of strategies such as mechanical systems that reduce energy consumption, the use of renewable energy, water-saving fixtures, and rainwater and greywater applications reveals that sustainability performance is largely expressed through quantifiable environmental gains. This finding suggests that future policies and incentives should safeguard existing energy and water efficiency practices, whilst also supporting the transfer of this performance to less well-represented areas of sustainability. Consequently, material selection, recycled content, environmental product declarations, construction waste management and the life-cycle approach are addressed as priority areas for development in the policy recommendations.

One of the study's other notable findings is that the 'materials and resources' category is not represented as strongly as energy and water in many projects. This finding is consistent with the studies by Deligöz et al. (2020) and Hashi and Kasapoğlu (2023), which indicate that material-focused credits are often a more selective, documentation-based field that is more closely linked to the supply chain. However, the implementation of topics such as recycled content, local materials, environmental product declarations and waste management is directly linked not only to design decisions but also to production, procurement, certification and implementation capacity (Kubba, 2017). Consequently, the relatively limited performance in the 'materials and resources' category is interpreted as a reflection not only of design preferences but also of the structural challenges encountered during implementation processes.

Another key finding of the study is that the categories of indoor environmental quality and location-transport sustainability also emerged as significant factors. This finding is consistent with studies (Allen et al., 2015; Wei et al., 2015; Karimi et al., 2023) demonstrating that green buildings encompass not only energy-saving technical aspects but also human-centred dimensions such as user health, comfort, accessibility and quality of life. Furthermore, the need to evaluate sustainable buildings not only at the building scale but also within the urban context, in terms of public transport access and alternative transport options, is emphasised in both sustainable urban planning and certification literature (Campbell, 1996; Jenks & Jones, 2010; Doan et al., 2017). In the Izmir case study, the prominence of factors such as proximity to public transport, cycling facilities, low-emission vehicle zones, use of natural light, indoor air quality and thermal comfort demonstrates that sustainability is addressed within an integrated framework that balances technical efficiency with user experience. This finding demonstrates that sustainable building policies should be based not only on energy and water savings, but also on user health, accessibility, public transport links and alternative transport options.

The differences emerging based on building types are an important finding that warrants discussion. Office and administrative buildings focus on energy efficiency, user comfort and urban accessibility. Industrial buildings, meanwhile, emphasise measurable environmental performance, process-based resource management and waste control. In commercial buildings, user access and visible environmental practices are prioritised; in residential projects, quality of life and a healthy indoor environment are key; while in infrastructure and specialised-use buildings, operational continuity and large-scale system performance take precedence. This aligns with studies (Doan et al., 2017; Shan & Hwang, 2018; Deligöz et al., 2020) which indicate that while green building certification systems provide a common framework for all buildings, implementation priorities vary according to building type, usage scenarios and functional requirements. In this context, the example of Izmir demonstrates that sustainability does not offer a one-size-fits-all design model; rather, it is addressed through different strategic priorities across various building types. In this context, rather than applying the incentives, guidelines and performance criteria to be drawn up at city level in the same way to all building types, it would be more appropriate to take into account the specific priorities of office, industrial, commercial, residential and special-purpose buildings.

The findings of this study demonstrate that green building certification processes transform the built environment through both architectural design strategies and urban planning decisions. The performance patterns of the buildings examined across the city of Izmir reveal how sustainability objectives are reflected at the plot-scale level and highlight the constraints at the urban scale. The high scores achieved by certified buildings in Izmir, particularly in the 'Location and Transport' and 'Sustainable Spaces' categories, indicate that these projects align strongly with trends towards public transport integration, pedestrian and cycle accessibility, and transit-oriented development. This relationship between the success of individual buildings and the city's existing infrastructure and transport network aligns perfectly with the vision of the Izmir Green City Action Plan (YŞEP; Izmir Metropolitan Municipality, 2020a) to improve the quality of urban life and reduce transport-related emissions. The fact that a significant proportion of the projects examined consist of large-scale commercial, industrial and corporate investments indicates that certification practices have become more prominent in projects with high investment capacity. However, as the study did not directly analyse rent levels, land values or spatial clustering within cities, it is not possible to draw a definitive conclusion regarding the socio-economic reasons behind this distribution. Furthermore, the preference for the BREEAM In-Use system in large-scale existing buildings, such as shopping centres, demonstrates that the green transition is not limited to new construction processes alone, but is also a powerful tool in terms of operational performance improvements for the existing building stock and the city's energy efficiency policies.

The high performance demonstrated in the 'Energy and Atmosphere' and 'Water Efficiency' categories at the architectural and building scale is in line with the commitment made under the Izmir Sustainable Energy and Climate Action Plan (SECAP; Izmir Metropolitan Municipality, 2020b). Project descriptions highlight efficient mechanical systems, low-energy-consumption equipment, renewable energy applications and water-saving technical solutions. However, as the level of detail regarding passive design decisions in publicly available documents varies from project to project, it is not possible to make a clear distinction as to whether high performance stems from technical systems or from passive spatial solutions. Furthermore, the fact that the 'Materials and Resources' category is represented to a lesser extent than the 'Energy' and 'Water' categories indicates that there is scope for improvement in terms of the circular economy, the use of low-carbon materials and resource efficiency. The limited visibility of local and recycled materials may be linked to various factors such as the supply chain, cost, certification or implementation capacity. However, as these factors were not directly examined in the study, it is not possible to attribute the low performance to a specific cause.

The stringent geometric and spatial requirements of current zoning plans frequently clash with the goal of green building certification processes (like LEED and BREEAM) to maximize environmental performance from the design stage onward. Fundamental planning parameters, such as building layout and number of storeys, as defined by implementation plans, can limit a building's potential for passive climate control, energy efficiency and indoor environmental quality. For example, the fact that building layout in zoning plans is generally defined along the road frontage line, and that mandatory setback areas do not permit ideal orientation along the north-south axis, makes it impossible to optimise the building mass in relation to the sun. This situation diverts buildings away from passive design strategies in the 'Energy and Atmosphere' categories of LEED and BREEAM, rendering them dependent on mechanical climate control systems.

Similarly, building layouts characterised by adjacent and block-style arrangements that obstruct airflow block the prevailing wind corridors, thereby eliminating the potential for cooling through natural ventilation. Furthermore, the building layout and number of storeys specified in the implementation master plans, along with the associated floor area ratios (FAR), do not allow for flexibility in massing or surface-to-volume ratios. Compact or stepped mass designs, which are ideal from a climatic perspective, become unfeasible when constrained by floor-count limits and setback distances; the resulting expansion of the thermal envelope inevitably increases heat loss and gain. These standard planning decisions, taken without regard for the 'right to sunlight' between plots, increase the shading effect of neighbouring buildings, thereby reducing the efficiency of photovoltaic (PV) panels and making it difficult to score points for natural daylight and views. Furthermore, floor area ratio (FAR) regulations hinder ecological infrastructure schemes—such as rainwater harvesting and the reduction of surface water runoff—by limiting the amount of open green spaces and permeable surfaces within a plot. Consequently, this situation necessitates the development of new urban policies that will free the environmental performance targets offered by green building certifications from the restrictive impact of traditional planning tools, shift sustainability from being a plot-based architectural endeavour to one integrated with macro-climate objectives of Izmir, and extend the green transition across the entire city.

This current study distinguishes itself from three key trends identified in the literature. Existing research (Darko & Chan, 2017; Doan et al., 2017; Deligöz et al., 2020; Büyükünsal & Alıcı, 2023; Hashi & Kasapoğlu, 2023; Akşar, 2025) compare certification systems at a theoretical level, examine their general distribution at the national level in Türkiye, or focus on a single building type. This study examines LEED and BREEAM certification records with different functions located in a specific city, discussing the relationship between credit categories and building types through a multi-typology sample. In this respect, the study contributes to filling a gap in the literature by revealing how sustainability performance is shaped at the local level. However, the research also has certain limitations. As the study was conducted using a document analysis method, the assessments were limited to the available project data, scorecards and project descriptions. Furthermore, the fact that the projects were assessed according to different LEED types and versions makes it somewhat difficult to compare the total scores directly. Consequently, the findings have not been presented in terms of absolute score superiority but have been structured around category concentrations and the nature of sustainability strategies. In this regard, the research not only highlights the distribution of LEED and BREEAM certification records in Izmir, their performance areas, and the sustainability strategies that vary by building type; it also offers a comprehensive analytical framework by linking these findings to urban planning tools to develop policy recommendations at a macro level using the Izmir case study.

7. Conclusions and Policy Recommendations

This current study has demonstrated that LEED and BREEAM certification records in Izmir are not limited to a single type of building; rather, they have gained typological diversity by extending across different building types such as offices, industrial, educational and residential. However, while this sectoral diversity is evident at the functional level, it has not been achieved at the spatial and socio-economic levels. The findings indicate that green building practices do not exhibit a homogeneous distribution across the city; rather, they are concentrated primarily in projects with high investment capacity—such as large-scale commercial buildings, industrial facilities and branded residential developments—even when these projects have different usage scenarios.

When considering macro-level objectives such as mitigating the urban heat island effect or ensuring urban water management, it is clear that these isolated successes—which remain the sole initiative of specific capital groups—will prove insufficient in improving the city's overall ecological performance and climate resilience. This situation necessitates that practices enhancing environmental performance be moved beyond the realm of luxury and exceptional projects, and instead be disseminated through planning policies to standard building production and the city as a whole. In order for Izmir to establish an integrated climate-resilient city model aligned with its SECAP (Sustainable Energy and Climate Action Plan) and YŞEP (Green City Action Plan) targets, fundamental policy changes are required both in local authorities' urban planning processes and in architectural design strategies. The policy recommendations developed in this context are presented below.

Performance-Based Urban Planning and Incentive Mechanisms: Current urban planning parameters largely treat the built environment through a two-dimensional framework of regulation and plot division. However, green building performance requires three-dimensional interactions between building masses and climatic data such as solar paths and prevailing winds, as well as volumetric assessments such as shadow analysis. In order for buildings to generate flexible design solutions that integrate with topography and climate, traditional planning tools must be adapted and reinterpreted through the concept of 'Performance-Based Planning'. Building regulations and conditions, such as building layout and number of storeys, must be updated in a way that does not restrict a building's potential for passive climate control and natural ventilation, while safeguarding the right to sunlight for neighbouring plots.

On the other hand, in order for Izmir Metropolitan Municipality to achieve its 40% emissions reduction target for 2030, green building certification should not be left solely to the initiative of the private sector. In implementation master plans, incentives should be defined for projects that meet a specific green building standard (e.g. LEED Gold/BREEAM Excellent) or commit to complying with SECAP's water and energy conservation targets. Planning notes should be developed that include reductions in urban infrastructure contribution shares, exemptions from planning permit fees, or additional floor area rights designed within limits that do not disrupt the urban fabric. Furthermore, to ensure that projects' achievements in the 'Location and Transport' category translate into spatial policy, mixed-use decisions should be promoted; residential, commercial and amenity areas should be integrated in a way that reduces car-dependent mobility, thereby strengthening sustainable urban transport networks.

Integration of Urban Green Infrastructure and Water Management: Although the study shows that projects perform strongly in the area of 'water efficiency', from an urban planning perspective, it is insufficient for these buildings to remain as sustainable 'islands' within their own property boundaries. Confining rainwater harvesting and treated greywater solely to the mechanical volumes of the relevant plot or using it only to irrigate its own landscaping limits the vision of urban resilience. In Izmir, which is vulnerable to the effects of the climate crisis such as extreme heat and drought, the significant surplus water generated by large-scale commercial buildings and industrial facilities in particular must be channelled into the city's blue-green infrastructure system. This water should be designed as an ecological infrastructure component that nourishes urban agricultural areas, parks and tree-lined walkways, and ecological corridors should be established between plots.

Resilient Transformation of the Existing Building Stock and Public Leadership: The adoption of the BREEAM In-Use system in existing commercial buildings, such as shopping centres, demonstrates that sustainability holds significant potential not only in new building processes but also in improving the operational performance of the existing building stock. In line with the objective of developing safe and secure residential areas outlined in Izmir's strategic documents, urban regeneration processes should not be conducted solely with a focus on earthquake resilience. Improving the energy and water efficiency of the existing building stock should be made a legal requirement and treated as a mandatory parameter in urban regeneration strategies.

Public buildings must play a leading role in this building-scale transformation. The use of water-efficient fittings should be made mandatory in new buildings owned by Izmir Metropolitan Municipality; initiatives such as 'workshop roofs fitted with solar panels', as outlined in the SECAP, should be rolled out across educational and healthcare facilities. Requiring public projects to meet at least the 'Certified' level of green building criteria will act as a driving force in the implementation of the city's climate action plans.

Urban and Legal Policies for Sustainable Architectural Practices: Sustainability at the architectural scale must go beyond being a 'voluntary certification label' that adds value to a project after a building has been constructed, and instead become a fundamental prerequisite for building permit processes. Parcel-based architectural designs that prioritise local climate data, topography and passive climate control should not be left solely to the designer's initiative; these principles must be enshrined in a legal framework through context-specific 'Urban Design Guidelines' prepared by local authorities.

To improve the performance of materials that receive the lowest scores in green building assessments, the principles of urban metabolism and the circular economy should be adopted. Under current market conditions, where access to local and environmentally friendly materials is limited, imposing legal requirements could stifle the sector. Therefore, public procurement should be used as a transformative tool for the market. By introducing 'green public procurement' criteria in urban regeneration projects and public tenders, building material manufacturers should be steered towards low-carbon production. Concurrently, a secondary materials market where construction and demolition waste is re-evaluated should be established by local authorities. Ultimately, institutionalising this environmental sensitivity—which manifests at the plot level—by integrating it into planning legislation and urban policies will ensure that Izmir becomes not merely a city housing green-labelled buildings, but a city that is itself "climate-resilient and sustainable".

CRediT Authorship Contribution Statement

Duygu Gökce: Conceptualization, Investigation, Validation, Writing – original draft, Writing – review & editing. Onur Tos: Conceptualization, Methodology, Investigation, Data curation, Validation, Writing – original draft, Writing – review & editing. Harika Tos: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Validation, Visualization, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Data will be made available on request.

Ethics Committee Approval

Ethics committee permission is not required.

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Resume

Prof. Dr. Duygu Gökce is a faculty member in the Department of City and Regional Planning, Faculty of Architecture at Süleyman Demirel University. She received her Ph.D. from Dokuz Eylül University. Her primary research areas encompass climate and urban resilience, urban regeneration, disadvantaged groups (women, children, youth, the elderly, Roma communities, refugees, etc.), and urban food systems. Prof. Dr. Duygu Gökce has contributed extensively to both national and international literature in these fields and has directed research projects funded by TÜBİTAK and BAP (Scientific Research Projects). In line with her core research interests, she has supervised various completed graduate theses, with a particular focus on urban resilience.

Onur Tos, who graduated first in his class from the Department of Public Relations and Advertising at the Faculty of Communication at Ege University in 2015, earned his master's degree from the Institute of Social Sciences at Uşak University in 2018 with a thesis titled "The Perceived Image of Political Party Leaders in the Grand National Assembly of Turkey: A Study Focusing on State Universities in Izmir." Tos completed his doctoral studies in the Communication Research Program within the Department of Public Relations and Advertising at the Institute of Social Sciences, Ege University, between 2019 and 2023. On March 5, 2020, at the 6th Gender Justice Congress organized by KADEM and hosted by Istanbul University, she was awarded the prize for the third-best paper presented at the congress for her paper titled "Generations X and Z's Perception of Parenting Based on Cultural Change." On December 22, 2020, she began working as an Instructor in the Department of Marketing and Advertising at the Tarsus University Vocational School. In February 2021, she was appointed Chair of the Department of Marketing and Advertising, a position she continues to hold. Tos continues her work in the field of communication and her interdisciplinary research.

Harika Tos graduated in 2018 from the Department of Urban and Regional Planning at the Faculty of Engineering and Architecture, Yozgat Bozok University. She then completed her studies in the Department of Public Administration at the Faculty of Economics, Anadolu University, and in 2021, earned her master's degree with a 4.00/4.00 GPA from the Department of Urban and Regional Planning at the Institute of Natural Sciences, Süleyman Demirel University, with her thesis titled "From Urban Shelter to Inclusive City: Urban Refugees in Mersin (Tarsus)." During her master's program, she served as a researcher on a scientific research project conducted on the same topic. She continues her academic work in the fields of urban and regional planning, migration, inclusive cities, sustainable urbanization, city branding, climate change, and communication. In this context, she has published scientific articles in national and international peer-reviewed journals—particularly those indexed in ESCI—as well as presented papers at international scientific conferences and contributed book chapters to academic publications. She also continues to conduct interdisciplinary research that brings together the fields of urban planning and communication.