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Research Article

Sustainable Construction Practices in Turkey: Carbon and Energy Performance of LEED-Certified Buildings in Istanbul

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Abstract – This study presents a comparative analysis of the sustainability performance of LEED certified multi family residential projects implemented in Turkey. Two distinct groups of projects, holding Gold and Silver certification levels respectively, were examined. The projects were evaluated based on seven primary criteria established by the LEED certification system: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation, and Regional Priority Credits. A total of over 35 projects were included in the analysis, with their criterion specific scores and overall certification points reviewed. The data were sourced from official LEED certification reports and analyzed using quantitative methods. Mean scores and standard deviations were calculated to identify performance differences between projects. Additionally, qualitative data such as project type and ownership were incorporated into the evaluation. The results indicate that Gold certified projects generally demonstrate higher performance compared to Silver certified ones. Gold projects exhibited significant advantages in critical criteria such as energy efficiency and sustainable site utilization. Nevertheless, areas with potential for improvement were identified across both groups. Notably, differences were observed among projects in terms of material usage and innovative applications. This study provides an important reference for assessing the quality and efficiency of sustainable building practices. The findings offer guidance for reducing environmental impacts and advancing sustainability objectives within the residential sector.
There are no commercial or institutional affiliations between the institutions and projects included in this study.

Keywords – LEED Certificate, Sustainable Housing, Energy Efficiency, Water Efficiency, Indoor Environmental Quality, Materials and Resources, Innovative Applications, Regional Priority Credits, Multi-Family Residential Projects, Environmental Performance

I. INTRODUCTION

In contemporary times, the concept of sustainability has gained increasing prominence within the construction industry. Driven by escalating global environmental challenges and the rapid depletion of natural resources, criteria aimed at mitigating the environmental impacts of buildings have assumed critical importance. In this context, sustainable building certification systems offer internationally recognized standards for assessing and enhancing the environmental performance of construction projects. Certification programs such as LEED (Leadership in Energy and Environmental Design) conduct comprehensive evaluations spanning the design, construction, operation, and maintenance phases of buildings, addressing key factors including energy efficiency, water management, material utilization, and indoor environmental quality.

Sustainable building certifications not only yield environmental benefits but also generate positive economic and social outcomes. Measures such as energy conservation and water efficiency contribute to the reduction of operational costs, while attention to indoor environmental quality and occupant health enhances the overall quality of life within built environments. Consequently, the development of sustainable projects has become an indispensable element of the contemporary construction sector.

This study undertakes a comprehensive evaluation of projects implemented in Turkey that possess varying levels of certification. These projects are assessed based on LEED certification criteria and compared across several categories, including sustainable site development, water efficiency, energy and atmosphere management, materials and resources utilization, indoor environmental quality, innovation in design, and regional priority credits. By analyzing projects with two distinct certification levels, the study elucidates differences in performance as well as commonalities.

The principal aim of this research is to demonstrate the application of sustainability criteria at the project level and to analyze areas of strength and weakness within these projects. Accordingly, the study seeks to provide recommendations that may guide the development of future sustainable construction projects. Additionally, the research examines the success levels achieved by various project owners and types, thereby contributing to an understanding of sectoral development and implementation variations.

Within this framework, the study is expected to make a dual contribution: enriching the academic literature and informing practical efforts aimed at advancing sustainable building initiatives. The widespread adoption of sustainability principles within the construction sector and the enhancement of quality standards are crucial for minimizing environmental impacts and optimizing resource efficiency. Hence, the findings are intended to support the evolution of sustainable architectural and engineering practices.

The evaluation and comparison of sustainable building projects constitute essential tools for enhancing quality, optimizing energy and resource consumption, and improving living conditions in the sector. This study aspires to offer valuable insights to both experts and practitioners by conducting an in depth analysis of the sustainability performance of exemplary projects in Turkey.

In this context, LEED and similar green building certification systems have emerged as crucial tools for mitigating the environmental impacts of the construction industry, reducing energy consumption, and minimizing carbon footprints. Pekdoğan (2024), analyzing 134 LEED Platinum V4 buildings in Turkey, identified performance deviations in energy, atmosphere, and indoor environmental quality criteria compared to international averages, emphasizing the importance of local implementation particularly in optimized materials credits [1].

Similarly, Akşit and Baştanoğlu (2021) conducted a comparative evaluation of LEED Gold certified buildings between Europe and Turkey, revealing that Turkish buildings lag behind European averages, especially in terms of energy efficiency. Ribeiro, Scolaro, and Ghisi's (2025) international review highlighted that climatic conditions, building types, and discrepancies between simulation and actual performance lead to geographic variations in energy saving outcomes [2]

Another study focusing on energy use analysis, a meta analysis by Rebelatto et al. (2024), reported that methods applied in LEED, BREEAM, and DGNB certified office buildings reduced operational energy consumption by approximately 30%, with the most significant reductions observed in criteria such as Energy and Atmosphere [3].

The discussion between Newsham et al. (2009) and Scofield (2009) on the discrepancies between design simulations and actual energy consumption indicated that although LEED buildings consume on average 18–39% less site energy, some buildings exhibited higher energy use, and a strong correlation between certification level and performance was not established [4].

Conversely, examples such as EnergyX DY Building demonstrate the development of the zero energy building concept in international practice; while these projects may not achieve LEED certification levels, they serve as models for achieving carbon neutrality.

Finally, studies on artificial intelligence and smart building systems indicate that intelligent control technologies in HVAC systems have the potential to provide additional energy savings ranging between 8% and 20% [5].

The objective of this study is to broadly examine the sustainability performance of LEED certified buildings, with a particular focus on evaluating key environmental benefits such as energy savings and reductions in carbon emissions.

II. MATERIALS AND METHOD

In this study, LEED certified multi family residential projects in Turkey were evaluated. The examined projects were categorized according to their certification levels, specifically Gold and Silver. The projects were scored based on seven main sustainability criteria: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation, and Regional Priority Credits. The dataset consists of more than 35 projects certified in different years. The scores obtained from these projects are quantitative data extracted from LEED certification reports. These data allowed for a numerical comparison of the projects' performances. Methodologically, the scores for each criterion were first analyzed quantitatively. Performance differences among projects were identified through calculations of means and standard deviations. Additionally, for qualitative analysis, information such as project ownership, project types, and certification years were incorporated. This approach enabled an examination of contextual factors potentially affecting project performance. Both quantitative (scores, statistical calculations) and qualitative (project type, ownership details) data were employed in this research. This mixed method approach facilitated a more comprehensive assessment of the sustainability performance of the projects.

Table 1. Residential Buildings with LEED Gold Certification in Istanbul

Project Name	Score	Certification Year	Project Type	Owner Organization
Agaoglu Maslak 1453 A Blok	60	2017	Multi-Family Housing: Residential Complex	Ağaoğlu
Agaoglu Maslak 1453 B Blok	63	2018	Multi-Family Housing: Residential Complex	Ağaoğlu
Agaoglu Maslak 1453 C Blok	61	2017	Multi-Family Housing: Residential Complex	Ağaoğlu
And Pastel-Mavi Blok	63	2020	Multi-Family Housing: Apartment	-
And Pastel-Turuncu-1 Blok	66	2018	Multi-Family Housing: Apartment	-
And Pastel-Turuncu-2 Blok	65	2019	Multi-Family Housing: Apartment	-
And Pastel-Turuncu-3 Blok	66	2019	Multi-Family Housing: Apartment	-
And Pastel-Yesil-1 Blok	65	2020	Multi-Family Housing: Apartment	-
And Pastel-Yesil-2 Blok	64	2020	Multi-Family Housing: Apartment	-
And Pastel-Yesil-3 Blok	64	2020	Multi-Family Housing: Apartment	-
Andromeda Gold Resıdence Ataşehir	61	2013	Multi-Family Housing: Residential Complex	Akdeniz İnşaat Ve Eğitim Hizmetleri
Çınar Apartmanı	63	2018	Multi-Family Housing: Apartment	İstanbul Büyükşehir Belediyesi
Daire Kartal	62	2018	Multi-Family Housing: Apartment	Bodur Gayrimenkul Geliştirme A.Ş.
Erguvan Premıum Resıdence	65	2020	Multi-Family Housing: Residential Complex	Erguvan İnşaat Ltd. Şti
İş Cadde Konut	64	2021	Multi-Family Housing: Residential Complex	Türkiye İş Bankası Munzam Sandık Vakfı
İş Gyo Manzara Adalar Abc	62	2019	Multi-Family Housing: Apartment	-
Maltepe Pıazza Resıdence	62	2019	Multi-Family Housing: Residential Complex	-
Metropol İstanbul-B Blok	62	2017	Multi-Family Housing: Apartment	Varyap Gap Ortak Girişimi
Metropol İstanbul-C1 Blok	62	2017	Multi-Family Housing: Apartment	Varyap Gap Ortak Girişimi
Mustafa Bey Apartmanı	60	2017	Multi-Family Housing: Apartment	Terece Gayrimenkul A.Ş.
Narlıfe A Blok	60	2016	Multi-Family Housing: Apartment	Altensis İnşaat Enerji San. Ve Tic. Ltd. Şti.
Narlıfe B Blok	60	2016	Multi-Family Housing: Residential Complex	Altensis İnşaat Enerji San. Ve Tic. Ltd. Şti.

Narlıfe C Blok	61	2015	Multi-Family Housing: Residential Complex	Tepe
Nıdapark Seyrantepe	63	2018	Multi-Family Housing: Residential Complex	Tahincioğlu Gayrimenkul A.Ş.
Nıvo İstanbul B Blok	64	2020	Multi-Family Housing: Residential Complex	-
Oyak Dragos - A Blok	62	2024	Multi-Family Housing: Apartment	-
Oyak Dragos - B Blok	62	2024	Multi-Family Housing: Apartment	-
Soyak Soho	63	2014	Multi-Family Housing: Apartment	Soyak Yapı
Tekfen Bomontı Apartments	63	2012	Multi-Family Housing: Residential Complex	Tekfen Emlak Geliştirme
The House Resıdence	66	2017	Multi-Family Housing: Residential Complex	Yenigün İnşaat
Yıldız 45	64	2018	Multi-Family Housing: Apartment	Yıldız Mimari Tasarım

As shown in the table, among the LEED Gold certified multi family residential projects in the first group, the highest score of 66 was achieved by And Pastel-Turuncu-1, And Pastel-Turuncu-3, and The House Residence. The lowest score of 60 was observed in the Ağaoğlu Maslak 1453 A Block, Mustafa Bey Apartment, Narlıfe A Block, and Narlıfe B Block projects. This table includes a total of 31 projects, with an average score of approximately $\boldsymbol{X = 62.7}$. The standard deviation among the projects is approximately $\boldsymbol{SD = 1.7}$, indicating that the scores are very close to each other and exhibit a homogeneous distribution. This suggests that projects undertaken in different years and by different firms meet similar sustainability criteria.

Table 2. Residential Buildings with LEED Silver Certification in Istanbul

Project Name	Score	Certification Year	Project Type	Owner Organization
Dumankaya Flex Kurtkoy	50	2014	Multi-Family Housing: Apartment	Dumankaya İnşaat San. Ve Tic. A.Ş.
Baylo Suıtes	55	2011	Multi-Family Housing: Apartment	Zemin Yatırım
Tekfen Hep İstanbul B2	54	2018	Multi-Family Housing: Residential Complex	Tekfen
Tekfen Hep İstanbul B3	55	2018	Multi-Family Housing: Residential Complex	Tekfen
Tekfen Hep İstanbul B4	56	2018	Multi-Family Housing: Residential Complex	Tekfen
Tekfen Hep İstanbul B5	55	2018	Multi-Family Housing: Residential Complex	Tekfen
Soyak Konforıa Blok C	51	2018	Multi-Family Housing: Apartment	-
Soyak Konforıa Blok A	51	2018	Multi-Family Housing: Residential Complex	-
Soyak Konforıa Blok B	51	2018	Multi-Family Housing: Residential Complex	-
Nıvo İstanbul A Blok	52	2021	Multi-Family Housing: Residential Complex	-
Tekfen Hep İstanbul B10	54	2017	Multi-Family Housing: Apartment	Tekfen Emlak Geliştirme Ve Yatırım A.Ş.
Tekfen Hep İstanbul B8	55	2018	Multi-Family Housing: Apartment	Tekfen Emlak Geliştirme Ve Yatırım A.Ş.
Tekfen Hep İstanbul B11	52	2017	Multi-Family Housing: Apartment	Tekfen Emlak Geliştirme Ve Yatırım A.Ş.

Among the LEED certified multi family residential projects listed in the table, the highest score of 56 was observed for the Tekfen Hep Istanbul B4 Block. Conversely, the lowest score of 50 belongs to the Dumankaya Flex Kurtköy project. A total of 13 projects were analyzed in this table, with scores generally ranging between 50 and 56, indicating a moderate to low level of sustainability performance. The average score for these projects was calculated as approximately $\boldsymbol{X = 53.8}$. The standard deviation was approximately $\boldsymbol{SD = 1.8}$, suggesting that the scores are close to each other but distributed within a narrow, relatively low range. This indicates that most of the projects meet sustainability criteria to a limited extent and require improvements in certain areas.

Table 3. Evaluation Criteria for Residential Buildings with LEED Gold Certification

Project Name	Sustainable Sites	Water Efficiency	Energy and Atmosphere	Materials and Resources	Indoor Environmental Quality	Innovation	Regional Priority Credits	Score
Tekfen Bomontı Apartments	23	6	11	6	7	6	4	63
Andromeda Gold Resıdence Ataşehir	22	4	11	6	8	6	4	61
Narlıfe	16	7	14	6	7	6	4	60
Soyak Soho	21	8	14	5	6	5	4	63
Agaoglu Maslak 1453	16	6	15	6	9	6	2	60
Metropol İstanbul	20	7	9	6	11	5	4	62
The House Resıdence	22	10	12	3	10	6	3	66
Maltepe Pıazza Resıdence	22	10	9	5	9	5	2	62
Nıdapark Seyrantepe	21	6	14	5	9	5	3	63
Mustafa Bey Apartmanı	22	7	8	6	9	4	4	60
Daire Kartal	23	6	10	6	9	4	4	62
Nıvo İstanbul B Blok	22	6	11	6	10	6	3	64
Yıldız 45	20	6	11	8	9	6	4	64
Erguvan Premıum Resıdence	22	10	12	4	9	5	6	65
And Pastel	23	8	15	5	8	5	2	66
İş Gyo Manzara Adalar Abc	24	6	13	6	3	6	4	62
* Oyak Dragos	13 (3)(1)	7	15	4	10	4	5	62
* İş Cadde Konut	14(6)(1)	7	12	5	11	4	4	64

(*) correspond to those evaluated under the new LEED certification criteria.

The LEED certified multi family residential projects presented in the table were evaluated based on seven main criteria: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation, and Regional Priority Credits. The sum of these criteria constitutes the overall score of each project. The highest total score (66) was observed in *The House Residence* and *And Pastel* projects. These projects particularly stand out in the categories of Water Efficiency (10/10), Energy and Atmosphere, and Indoor Environmental Quality. For instance, *The House Residence* achieved the maximum score of 10 points in water efficiency, indicating optimal performance.

On the other hand, the lowest scoring projects (60 points) were *Narlıfe*, *Ağaoğlu Maslak 1453*, and *Mustafa Bey Apartment*. These projects generally received lower scores in criteria such as Sustainable Sites and Regional Priority Credits. Notably, *Ağaoğlu Maslak 1453* scored only 2 points in the Sustainable Sites category, the lowest among the group.

The standard deviation was calculated as approximately ***SD = 1.9***, indicating that most of the scores fall within the 60 to 66 range. This suggests that the projects generally meet the sustainability criteria at a similar level.

Table 4. Evaluation Criteria for Residential Buildings with LEED Silver Certification

Project Name	Sustainable Sites	Water Efficiency	Energy and Atmosphere	Materials and Resources	Indoor Environmental Quality	Innovation	Regional Priority Credits	Score
Dumankaya Flex Kurtkoy	14	6	11	4	7	4	4	50
Baylo Suıtes	18	2	12	6	8	5	4	55
Tekfen Hep İstanbul	20	4	11	5	8	6	2	56
Soyak Konforıa	15	4	9	6	10	6	1	51
Nıvo İstanbul A Blok	19	6	9	6	5	4	3	52

The projects listed in the table were evaluated according to LEED criteria, with the highest score of 56 awarded to the *Tekfen Hep İstanbul* project. The lowest score, 50, was recorded for the *Dumankaya Flex Kurtköy* project. The remaining projects fall within the 51 to 55 point range. This generally indicates that the projects meet the minimum sustainability requirements. The average score was calculated as approximately ***X = 52.8***, with a standard deviation of ***SD = 2.2***, suggesting that score differences among the projects are relatively limited, though there is some inconsistency in the level of compliance with the individual criteria.

A criterion based analysis reveals the following:

- *Baylo Suites* received only 2 points in the Water Efficiency category, representing the lowest performance in this area.
- *Soyak Konforia* contributed the least in the Regional Priority Credits category, with just 1 point.
- *Tekfen Hep İstanbul* excelled in the Innovation category, achieving a perfect score of 6 out of 6.
- *Nivo İstanbul A Block* demonstrated balanced performance in technical categories such as Water Efficiency and Materials and Resources, but its overall score remained slightly below the average.

III. DISCUSSION

Comparative Analysis of LEED Gold and Silver Projects

The LEED (Leadership in Energy and Environmental Design) certification is an internationally recognized evaluation system that assesses buildings based on their environmental impact and sustainability performance. Within this system, projects are categorized into four certification levels—Certified, Silver, Gold, and Platinum—based on the total points earned. In this analysis, projects with Gold certification are presented in the first table, while those with Silver certification are included in the second table.

Overall Performance Comparison

The score range for the Gold certified projects in the first group was $X = 60–66$, while for the Silver certified projects in the second group, the range was $X = 50–56$. The average score for Gold projects was calculated as approximately $X = 62.8$, whereas the average for Silver projects was $X = 52.8$. This approximate 10 point difference indicates that Gold projects implement sustainability strategies in a more comprehensive and effective manner.

The standard deviation for Gold projects was $SD = 1.9$, compared to $SD = 2.2$ for Silver projects. This suggests that the distribution of scores among Silver certified projects is less consistent, with some projects scoring significantly lower, reflecting uneven performance across sustainability criteria.

Criterion Based Comparison

Table 5. Criterion Based Comparison of Residential Buildings with LEED Gold and Silver Certifications

Criterion	Observations in Gold Projects	Observations in Silver Projects
Sustainable Sites	Values generally range between 20–24, indicating strong contributions.	Lower values; ranging from 13–20, with Oyak Dragos notably low.
Water Efficiency	Ranges from 6–10, many projects scored 8 or 10 points.	Between 2–6, notably Baylo Suites scored only 2 points.
Energy and Atmosphere	Scores between 8–15, with high scores such as And Pastel's 15 standing out.	Ranges from 9–12, showing lower contributions compared to Gold projects.
Materials and Resources	Varies between 3–8, generally scoring 5–6 points.	Between 4–6, similar but generally at the lower bound.
Indoor Environmental Quality	Between 6–11, some projects (e.g., Metropol: 11) perform very well.	Scores range from 5–10, but some projects (e.g., Nivo A Block: 5) scored low.
Innovation	Between 4–6 points, with most projects achieving the maximum score (6).	Between 4–6, relatively successful in this category.
Regional Priority Credits	Generally 3–4 points, with some projects earning full points.	Between 1–4, average is lower; some projects received only 1 point.

Gold level projects generally demonstrated superior performance in environmentally impactful categories such as Sustainable Sites, Water Efficiency, and Energy and Atmosphere. These projects widely implemented water saving systems, utilized high efficiency energy equipment, and adopted environmentally sensitive site planning strategies. Although Silver projects showed moderate success in areas like Innovation, they were insufficient in fundamental categories such as Water Efficiency, Regional Priority Credits, and Energy Efficiency. Typically, these projects met the basic LEED requirements but did not incorporate advanced sustainability strategies.

Analysis by Building Type and Developer

An analysis of the data by developer reveals notable variations in sustainability performance across different projects. Tekfen is represented in both the Gold and Silver certification categories, suggesting a diversified approach to sustainable construction practices across its portfolio. Projects at the Gold level exhibited more balanced and comprehensive sustainability outcomes, likely reflecting more integrated design and planning strategies.

Similarly, Soyak appears in both certification levels, with *Soyak Soho* achieving Gold and *Soyak Konforia* attaining Silver. The lower performance of the Silver certified project may indicate project specific strategic differences, potentially in areas such as material selection, energy efficiency measures, or stakeholder engagement.

The *Nivo Istanbul* project presents an illustrative case of intra project variability. While Block B attained a Gold rating with a score of 64, Block A was rated Silver with a score of 52. This discrepancy underscores the possibility that distinct sustainability strategies or implementation practices were applied within different components of the same development.

Project Specific Strengths and Weaknesses

Table 6. Strengths and Weaknesses of the Projects

Project Name	Strengths	Weaknesses
The House Residence	Water efficiency (10/10), indoor environmental quality	Low material performance
And Pastel	Energy efficiency (15), sustainable site	Low regional priority (2/4)
Erguvan Premium Residence	Regional priority (6/4*), water efficiency (10)	Material performance (4/14)
Soyak Soho	Water efficiency (8), energy performance (14)	Innovation score (5/6)
Tekfen Bomonti Apartments	Sustainable site features (23)	Average energy performance (11/53)
Dumankaya Flex Kurtköy	—	Sustainable site (14), low overall score
Baylo Suites	Energy performance (12/53)	Weak performance except water efficiency (2) and indoor (8)
Tekfen Hep İstanbul	Innovation (6/6), sustainable site (20)	Regional priority (2)
Soyak Konforia	Indoor environmental quality (10), innovation (6)	Regional priority (1), low energy performance (9/53)
Nivo İstanbul – Block A	Sustainable site (19)	Indoor quality (5), energy performance (9/53)

Overall, projects at the Gold level have demonstrated successful performance across most fundamental LEED criteria and serve as exemplary models of environmentally friendly construction. In contrast, Silver level projects generally remained at an adequate threshold, revealing areas with potential for improvement. This analysis underscores that sustainable construction should not be limited to meeting basic requirements, but rather necessitates the adoption of more strategic and integrated design approaches to achieve higher performance. Investments, particularly in energy and water efficiency, have been the most decisive factors in elevating projects to the Gold level.

IV. CONCLUSION

In this analysis, multi family residential projects certified at LEED Gold and LEED Silver levels in Turkey were comparatively examined. The sustainability performances of the projects were evaluated based on seven main criteria: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation, and Regional Priority Credits.

Gold certified projects generally demonstrated a more comprehensive adoption of environmental sustainability principles, achieving high scores particularly in water and energy efficiency, as well as indoor comfort. Silver level projects, while meeting basic sustainability requirements, mostly contributed at a minimal level and showed areas with potential for improvement. Notably, many Silver projects exhibited low performance in energy and water savings, innovative applications, and sensitivity to regional priorities.

This analysis indicates that the sustainable housing sector in Turkey is still in a developmental phase, and integrated sustainability approaches have not yet been fully implemented across all projects. In this context, several recommendations are proposed to improve the current situation and to foster the construction of buildings with higher environmental performance in the future:

- Enhance Local Government Support: Municipalities and local authorities can promote sustainable construction by offering zoning incentives and tax benefits that encourage the adoption of certification systems like LEED.
- Organize LEED Training Programs: Training for project developers, contractors, and architects on sustainability criteria should be increased, and certification systems should be made more accessible and understandable.
- Promote Energy and Water Efficiency: Particularly at the residential scale, subsidy or credit mechanisms should be established to encourage the use of materials and equipment that improve energy and water savings.
- Support Local and Innovative Materials: Domestic production in sustainable building materials should be supported, and the use of low carbon footprint technologies should be encouraged.
- Prioritize Indoor Environmental Quality: To create comfortable and healthy living spaces, the use of natural ventilation, daylighting, and low VOC materials should be incentivized.
- Increase Sensitivity to Regional Priority Criteria: Projects should deliver solutions that are responsive to the climate, infrastructure, and social needs of their specific regions.
- Expand Performance Based Certification: Systems that monitor building performance throughout its lifecycle (such as measurement and energy management) should be integrated, beyond the design phase alone.
- Develop Public Private Partnerships: Public institutions and the private sector should collaborate to develop sustainable housing projects, and exemplary practices should be shared publicly.
- Introduce Green Financing Models: Financial instruments such as “green loans” or “green bonds” targeted at sustainable projects should be developed, and the construction sector should be directed towards these resources.
- Certifications Should Be a Standard, Not Just Prestige: LEED and similar systems should be adopted not merely as marketing tools, but as building standards that carry environmental responsibility throughout the building’s lifecycle.
- Make Sustainability Mandatory in Urban Transformation: Compliance with sustainability criteria in new housing projects should be legally enforced to enhance construction quality.
- Establish a Database: Performance data of green building projects in Turkey should be collected in a centralized system and made accessible for academic, public, and sectoral use.

These recommendations can foster both the quantitative and qualitative development of sustainable housing projects in Turkey through joint responsibility and cooperation between public and private

sectors. The correct understanding and effective implementation of international certification systems like LEED represent a significant step towards Turkey's climate goals.

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Note: This study was conducted using publicly available data from certain LEED certified residential projects in Turkey. There are no commercial, institutional, or sponsorship relationships with any of the mentioned organizations, institutions, or companies. The work is intended for academic purposes and presents an impartial evaluation.