7. RELATED LEGISLATIONS AND BUILDING CERTIFICATION SYSTEMS

"Energy efficiency" has become the main agenda of all countries of the world in terms of environmental concerns and problems that are based on the use of resources arising from the global crises, and has made it necessary to take drastic steps to increase energy efficiency. In this context, the main objective of the regulations on energy efficiency is to supply the energy needed in uninterrupted, reliable, clean, and inexpensive ways and increase the diversity of resources, one of the key elements of the security of energy supply.

After the first oil crisis in 1973, new energy policies were needed to be developed, in this context, reducing the energy consumption to reasonable levels, improving the security of energy supply, and protecting the environment in all areas based on energy were adopted as priority issues. The establishment of the International Energy Agency (IEA) was the first significant step taken in this context. The IEA annually publishes data such as energy supply and consumption amounts of countries, greenhouse gas emission rates, the use of energy expenses on a sectoral basis, etc. With the second oil crisis in 1979, energy efficiency has become much more important and limiting the consumption of fossil-based fuels and the use of renewable energy sources were noted in addition to measures such as reducing oil consumption and energy saving.

In 1987, the United Nations Commission on Environment and Development published a report called the Brundtland Report, and the concept of sustainable development was officially articulated for the first time. The Brundtland Report stipulates that poverty reduction and economic growth without harming the environment will be possible through the use of environmentally friendly technologies. Thus, the energy issue, which is considered as a global problem that threatens the future of the world, the emergence of the energy-environment-built environment issues, and the development of regulations on the liabilities that the built environments will face during their design, construction, and use have become priority issues.

7.1. International Regulations and Their Development Process

Climate change brought about by the economic crises and the increasing industrialization and urbanization revealed the need for efficient and economical use of existing energy but also drew attention to the conservation of natural balance and environmental problems. The first important step taken in the context of climate change and environmental issues is the United Nations Framework Convention on Climate Change, which was signed at the United Nations Conference on Environment and Development in Rio de Janeiro

in 1992 and reached a universal dimension with 195 countries participating in the process. The Convention encourages parties to reduce greenhouse gas emissions, cooperate on research and technology, and protect the natural resources such as lakes and oceans that reduce the greenhouse gas impact. To this end, it has imposed "common but differentiated responsibilities" on the countries, taking into account the priorities and special conditions of the countries (URL-1).

The Energy Charter Treaty, signed in Lisbon in 1994 by 51 states and the European Communities and entered into force in 1998, is the first multilateral document supporting international cooperation in the energy sector and has an important place in international law. The main objectives of the agreement are to increase the security of energy supply, maximize the efficiency in energy production, conversion, transport, storage, distribution, transmission, and use, strengthen security, and minimize environmental problems. With the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), which was built on Article 19 of the Energy Charter Treaty, it is stipulated that member states should set political goals in order to increase energy efficiency and reduce the impact of energy use on the environment (Baklavacı and Akıntürk, 2016).

The Kyoto Protocol, signed in Kyoto, Japan in 1997 and adopted by OECD member states with responsibility for the emergence of climate change, is a highly important step in the development of the environmental dimension of energy policies. As part of the fight against global warming and climate change, the countries that have signed the protocol have committed to balancing greenhouse gas emissions and preventing human movements that have an impact on the change of the climate system.

The EU has taken serious decisions in 2007 against problems such as security of supply, competition, failure to create a common market, and depletion of energy resources experienced in the energy sector in the following periods. In the EU countries, the increasing dependence on external resources in connection with energy consumption, the rapid increase in resource use despite this dependence, the excess cost of investments to reach energy sources, the interrelationship of many factors such as climate change and environmental problems have led to the need for a common political, social and ecological path. For this purpose, An Energy Policy for Europe, which was established in 2007, aims to reduce energy use by 20%, increase the use of renewable energy sources by 20% and reduce greenhouse gas emissions by 20% by 2020. In addition to these goals referred to as "20-20-20", the creation and protection of a common internal market became part of the new energy policy and a program was established covering incentives and supports in related matters (URL-2).

The European Commission released its "Framework Strategy for a Resilient Energy Union with a Forward-looking Climate Change Policy" document on February 25, 2015, intending to transform the energy policy of the Union into a new "European Energy Union". Referred to as the Energy Union Framework Strategy, the document lists five complementary and closely related priorities designed to enhance energy security, sustainability, and competitiveness (URL-3):

- Ensuring the security of energy supply,
- The creation of a fully integrated common European energy market,
- Increasing energy efficiency to contribute to reducing energy demand,
- Non-carbonization of the economy,
- Research, innovation, and competitiveness.

The most comprehensive agreement signed on climate is the Paris Agreement, which was held in Paris in 2015, prepared in accordance with a resolution taken at the 2nd United Nations Conference on Climate Change and opened for signature in 2016. The goals of the agreement, also known as the Climate Change Agreement, are to protect human health, keep the rise in global warming below 2oC and restrict greenhouse gas emissions. The Paris Agreement covers the Kyoto Protocol and provides the highest participation in environmental issues.

The energy policy of the European Union (EU), whi-

ch has the largest market in the energy field, is very effective and important in this field. In this context, the EU Commission has prepared Green Papers and White Papers taking into account the needs. The green books aim to initiate a European-scale discussion and consultation process by suggesting a proposal in a specific area, while the white papers also aim to set forth concrete proposals for actions of the Union on a specific issue. The White Paper: An Energy Policy for Europe was published in 1995, setting out the general principles and objectives for the EU energy domestic market, in the context of the debate that began towards the end of the 1980s among the countries on the need to integrate existing fragmented markets and how the existing energy stocks could be diverted without damaging the environment (Candan, 2004). The Green Paper: Energy for the Future: Renewable Sources of Energy for a Community Strategy, prepared by the EU Commission in 1996, was published and the benefits of renewable energy sources were discussed in this book. In the abovementioned Green Paper, it is emphasized that renewable energy will reduce the EU's dependence on energy imports and will have a positive impact on regional development and employment issues (URL-4).

The title of the second green paper published in November 2001 was 'Green Paper: Towards a Europan Strategy for the Security of Energy Supply, and the obligation of the Union to develop a common strategy against energy-related risks as soon as possible has been opened to debate, expecting that external dependence on energy supply will increase by 70% (Türkeş and Kılıç, 2004). The third green paper entitled 'Green Paper: The Support of Electricity from Renewable Energy Sources' was published in December 2005. Thus, the need to expand the use of renewable energy sources and harmonize relevant legislation at the Union level has been proposed in the context of the objectives of the second Green Paper. The last green paper entitled 'Green Paper: A European Strategy for Sustainable, Competitive and Secure Energy' was published in 2006 and the necessity to create a common policy in order to reach the objectives of economic, social and environmental sensitivities was highlighted again, the necessity to take steps in the legal field was stated once again. The white paper, which set a target of 20% renewable source share in energy supply and was titled 'White Paper: An Energy Policy for Europe' was published in 2007 and described the EU Commission's report named 'Renewable Energy Roadmap: Renewable Energy for a Sustainable Future in the 21st Century'. The report sets targets for ensuring the EU's energy security and efficiency, lowering greenhouse gas emissions that lead to global warming, and enabling the use of renewable sources by alternative means (the use of biogas in building heating systems or use of wind energy in buildings). In an environment in which the reduction of greenhouse gas emissions is targeted by promoting daily use of renewable energy sources, challenging, supportive, and incentive regulations were put in order for the improvement of energy efficiency and environmental sensitivity in the building industry, like other industries (URL-5, URL-6).

Tools such as statutes and directives have been used to implement common policies and regulations created at the Union level. It has been mandated for the member states to transpose these binding tools to their legal frameworks. In this context, the first EU directive affecting built environments is the Council Directive 89/106/EEC - Construction Products Directive. According to the directive, which sets the methods and principles covering the conformity assessment procedures expected from the building materials produced for use in all construction works and market surveillance and inspection, the evaluation criteria for the building materials are determined as follows (URL-6):

- Mechanical strength and stability,
- Safety in case of fire,
- Hygiene, health, and environment,
- Safety of use,
- Noise protection,
- Energy saving and thermal capacity.

Afterward, in 1992, 'Council Directive on Efficiency Requirements for New Hot-water Boilers Fired with Liquid or Gaseous Fuels (92/42/EEC),' 'Council Directive on the Indication by Labeling and Standard Product Information of the Consumption of Energy and Other

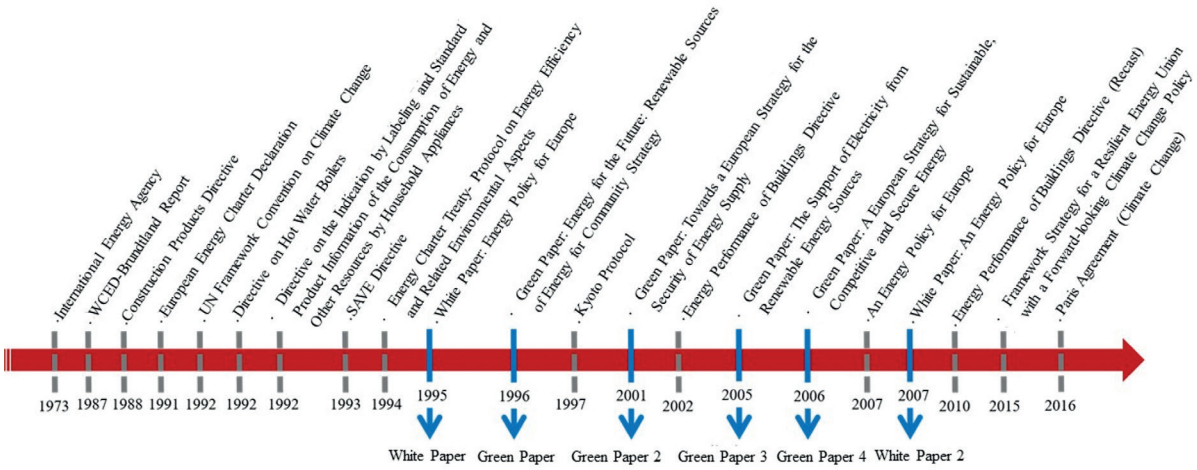

Figure 7.1. Development Process of the International Regulations

Resources by Household Appliances (92/75/EEC)' and in 1993, 'Council Directive to Limit Carbon Dioxide Emissions by Improving Energy Efficiency (SAVE) (93/76/EEC)' has been published. The SAVE Directive aimed to limit carbon dioxide emissions by improving energy efficiency programs to be implemented by member states and to reduce greenhouse gas emissions by ensuring energy savings by requiring the use of heat control and heat cost allocator systems in homes and workplaces in these states.

"Energy Performance of Buildings Directive (2002/91/EC) - EPBD" which is a continuation of these directives and has a significant effect on the built environments, was adopted in 2002 and renovated in 2010 in accordance with technology and current conditions. The directive, which sets out the methods to determine energy performance in buildings, mandates the definition of thermal and airtightness properties of buildings, natural ventilation facilities, heating and cooling equipment, insulation and heat bridge properties, lighting, and indoor conditions. It also introduced the application of energy certification in buildings. In 2010, in the 'Energy Performance Building Directive -2010/31/EU – EPBD-Recast' comprehensive targets have been introduced, the use of a comparative methodology was stipulated to increase energy efficiency by ensuring optimum cost levels and a zero energy building target has been set for the first time.

The development process of the international regulations is shown in Figure 7.1 in chronological order.

7.2. Effects of Regulations on Built Environments

Global problems such as global warming and climate change, increased carbon emissions, and greenhouse gas impacts arising from the interaction between built environments and the natural environment have forced energy efficiency-oriented design and construction processes. The European Commission for Standardization (CEN) has been authorized by the EU to provide data and develop relevant accounting methods within the scope of the obligations imposed by regulations setting out the limits and targets on these issues. Technical committees have been established in the member states. Thus, due to the significant extent of the share of energy efficiency in the building sector, it was aimed that each state could control the problems arising from the built environment with its own harmonized legal regulations.

With the coming into force of the EPBD, which is based on providing the necessary indoor conditions for user comfort and realizing energy efficiency in buildings with a focus on cost-effectiveness taking into account outdoor air conditions, the following objectives affecting energy performance in buildings

have become essential in the design and construction of built environments (URL-5):

- To create a common computational methodology framework to be used to calculate the energy performance of buildings,
- To determine the minimum energy performance requirements for new buildings,
- To determine the energy performance requirements that will be applied in case of changes that will affect energy performance in existing buildings,
- To prepare an energy performance certificate,
- To perform the regular inspection of hot water boilers and air conditioning systems used in buildings.

It was stipulated that the calculation methodology, which would be prepared with a general validity in the EU countries, would be harmonized by the states due to the difference in regional conditions. In this context, the general framework of computational methodology was determined as follows (URL-6):

- Thermal properties and airtightness of the building (envelope-interior sections)
- Heating installation and hot water system and insulation properties of these installations and systems
- Air conditioning installation
- Ventilation
- Lighting installation (especially in non-residential buildings)
- Location and orientation of the building, taking into account outdoor climatic conditions
- Passive solar systems and sun protection
- Natural ventilation
- Indoor climate conditions

Also, the effects of heating and electricity systems based on active solar systems and renewable energy sources, electricity provided by combined heat and power systems, neighborhood- or block-scale heating and cooling systems, and natural lighting conditions were also wanted to be taken into account in the calculations.

In the revised version of EPBD-Recast in 2010, improvements were made on the topics on energy requirements of buildings, conditions were made compelling and its monitoring during the harmonization period was guaranteed with the reports that states would submit to the commission at certain periods. Some of the innovations brought by EPBD-recast are as follows:

- The Commission should establish a "comparative system model" for minimum energy performance. Member states should use this model in comparison with the minimum energy performance requirements they have adopted according to regional conditions.
- Member states should draw up action plans to increase the number of "nearly zero-energy buildings (NZEB)" and regularly report such plans to the Commission.

Thus, the goal of increasing energy efficiency in buildings has been taken forward with the concepts of "cost optimum energy efficiency" and "nearly zero-energy building-nZB."

The measures to be taken regarding new and existing buildings were stated in Articles 6 and 7 of the Directive, respectively. While meeting performance requirements for new buildings, it has become obligatory to consider energy systems obtained from renewable sources, cogeneration, regional or block heating and cooling partially or entirely based on the energy from renewable energy sources, and efficient alternative energy techniques such as heat pumps in an integrated way during the design phase. It was stated for existing buildings if they undergo a major renovation that the energy performance of the building or its renovated part should meet the minimum energy performance requirements set out in the directive.

The principles of the framework, established for taking measures and implementing a comparative calculation methodology that will provide optimal costs of the expected minimum energy performance conditions required by the BEPD obligations, and the method, which was obliged to be prepared taking into account the own conditions of each state, were formed as follows:

- Identification of reference buildings,
- Determination of energy efficiency measures,
- Calculation of the amount of primary energy consumed in buildings as a result of energy efficiency

measures to be applied to reference buildings,
- Calculation of the costs of energy efficiency measures for reference buildings,
- Performance of the sensitivity analyses for cost analyses,
- Determination of the optimum cost level of energy performance requirements for each reference building.

This method, which aims to determine optimum levels in comparison with the integration of energy performance requirements and cost analyses of buildings, also leads to studies to determine nearly zero energy levels in buildings. Article 9 of the Directive addressed nearly zero energy buildings (NZEB), all new buildings to be constructed in the member states before December 31, 2020 are required to be built as NZEB, this date has been set as December 31, 2018 for public buildings (URL-7).

Also, there are many institutions and organizations within the EU that support low energy use and less carbon emissions of buildings and operate for coordination of the EU energy efficiency. Some of these are listed below (Onaygil, Erkin, Acuner Meylani, and Aktağ, 2007):
- CECODHAS Housing Europe, the European Federation of Public, Cooperative, and Social Housing (1988): Organizes collaborative projects with "the Initiative to Promote Nearly-Zero Energy Buildings" to benefit various architecture schools for energy efficiency.
- The European Alliance of Companies for Energy Efficiency in Buildings (EuroACE) (1998): The alliance, where European companies working on energy-efficient products come together, aims to increase the use of sustainable energy, reduce carbon emissions and provide workspace in the relevant field.
- Building Performance Institute Europe (BPIE): Helps improve building performances and reduce CO2 emissions caused by the energy consumed in Europe.
- BUILD UP Guidebook for Financing Energy Efficiency in Buildings: Works towards the needs of professionals and building authorities within the framework of energy efficiency in buildings.
- E2BA, Energy Efficient Buildings Association (2008): Co-founded the Energy Efficient Building European Initiative (E2B EI), a Europe-wide research program for energy-efficient buildings and regions and carries out research activities.

Within the scope of the obligations imposed by the directives, many details such as climate zone, physical properties, location, orientation of buildings, thermal capacities according to the type and thickness of materials used in transparent and opaque components, heat bridges, renewable energy source use, and lighting elements have become important, as well as compliance with norms and standards such as EN and ISO are also sought in selecting materials to be used and applications of these details. In this context, several standards related to thermal performance, energy needs and usage, indoor comfort and climate conditions, building automation and control systems, sustainability, and environmental issues have been developed in the building construction process. These standards affect and guide settlement decisions, determination of the building form, envelope design, and mechanical systems design integrated with the building, and the use of renewable energy sources in terms of macro and microclimate effects, building orientation, and inter-building relations. Data to be used in energy-efficient structure design parameters can be accessed from these standards.

7.3. Building Certificate/Documentation Systems

Today, there are many national and international certification systems used in the certification of buildings. Since these systems are established within the scope of assessment criteria, specifications, legal regulations, and standards of the states, some difficulties may be encountered due to local conditions in adapting any certification system to another state. Therefore, it is important to establish national certification of each state in the context of its local characteristics, regulations, and standards. A detailed list of building certification systems used in the world is given in Table 7.1.

Table 7.1. Building certificate systems

NAME OF THE CERTIFICATE	STANDS FOR	COUNTRY	YEAR
BREEAM	Building Research Establishment Environmental Assessment Method	UK	1990
BEPAC	Building Environmental Performance Assessment Criteria	Canada	1993
HK-BEAM	The Hong Kong Building Environmental Assessment Method	Hong Kong	1996
LEED	Leadership in Energy and Environmental Design	USA	1998
EEWH	Ecology, Energy Saving, Waste Reduction and Health	Taiwan	1999
Green Globes	-	Canada	2000
GBCS	Green Building Certification System	South Korea	2002
Green Star	-	Avustralya	2002
SBTool	Sustainable Building Tool	Multi partnered	2002
Protocollo Itaca	Ithaca Protocol	Italy	2003
Ecoprofile	Environmental Profile	Norway	2004
CASBEE	Comprehensive Assessment System Built Environment Efficiency	Japan	2004
Green Mark	-	Singapore	2005
Israeli Green Building Standard	-	Israel	2005
LiderA	Sustainable Assessment System	Portugal	2005
HQE	Haute Qualite Environmentale	France	2005
NABERS	National Australian Built Environment Rating System	Australia	2005
3-Star	-	Çin	2006
GRIHA	Green Rating for Integrated Habitat	India	2006
PromisE	PromisE	Finland	2006
CEPAS	Comprehensive Environmental Performance Assessment Scheme	Hong Kong	2006
DGNB	German Sustainable Building Council - Deutsche Gesellschaft für Nachhaltiges Bauen	Germany	2008
AQUA	AQUA	Brazil	2008
MINERGIE	Higher Quality of Life, Lower Energy Consumption - Mehr Lebensqualitat, tiefer Energieverbrauch	Switzerland	2008
GBI Malaysia	Green Building Index Malaysia	Malaysia	2009
BERDE	Built for Ecologically Responsive Design Excellence	Philippines	2009
PBRS	Pearl Building Rating System	United Arab Emirates	2010
Environmental Status	-	Sweden	-
SBAT	Sustainable Building Assessment Tool	South Africa	-

The BREEAM and LEED systems are used most commonly in the world and recognized by many countries that are members of the World Green Building Council – WGBC. Other than these, the most well-known and popular systems are Green Star, SBTool, CASBEE, and DGNB (Bulut, 2014).

BREEAM, the first criteria-based assessment system, created an application standard for design, construction, and operation of sustainable buildings and made the environmental performance of a building comprehensive and widely accepted measurements (URL-8). According to the BREEAM certification system, the environmental performance of buildings is evaluated over 100 points within the scope of ten different assessment criteria. The assessment criteria are rated at different weights according to the conditions of the country or geography where the building to be evaluated is located. The criteria and the weight of the scores for each criterion in Europe are given in Table 7.2 (BREEAM Ticari Binalar 2009 Değerlendirme Kılavuzu, 2013).

Table 7.2. BREEAM assessment criteria and scores

BREEAM ASSESSMENT CRITERIA		SCORE (%)
1	Management	12
2	Health and wellbeing	15
3	Energy	19
4	Transport	8
5	Materials	12.5
6	Waste	7.5
7	Water	6
8	Land use and ecology	10
9	Pollution	10
10	Innovation	10

The LEED system, which emerged with the idea that the building sector should develop itself in terms of sustainability, aims to change the materials and methods used in the building industry over time by taking into consideration the principles of sustainability and thus to ensure that buildings that cause minimal damage to nature are constructed. The LEED certification provides benefits such as reducing operating costs in building design and increasing the value of the building, reducing the emission of waste to storage areas, saving energy and water, being healthy and safe for users, reducing the emission of harmful greenhouse gases, providing tax rebates, zoning rights and other incentives in hundreds of cities, and proving environmental management and social responsibility commitment to the users (Cevahir, 2010).

In the system, the environmental performance of buildings is evaluated within the scope of eight different assessment criteria. Each criterion of the system has a specific score. A separate scoring has been created for the criteria according to each type of structure under the system scope. The assessment criteria and scores for 'LEED for New Construction' are given in Table 7.3 (URL-9).

Table 7.3. 'LEED for New Construction' assessment criteria and scores

LEED ASSESSMENT CRITERIA		SCORE (%)
1	Location and Transport	16
2	Sustainable Sites	10
3	Water Efficiency	11
4	Energy and Atmosphere	33
5	Materials and Resources	14
6	Indoor Environmental Quality	16
7	Innovation in Design	6
8	Regional Priority	4

GREENSTAR, a national-scale environmental assessment system unlike BREEAM and LEED certificates, was created in Australia to promote social awareness by establishing a common language on the advantages of green buildings and to provide recognition of environmental leaders. Among the purposes of the system is to determine the effects that emerge as a consequence of the building's life cycle analysis by promoting integrated design. 11% of commercial buildings in Australia have Green Star certification (URL-10). According to the Green Star certification system, the

environmental performance of buildings is evaluated over 100 points within nine different evaluation criteria. These criteria and the scores for each criterion are included in Table 7.4.

Table 7.4. Green Star assessment criteria and scores (Köteşli, 2013)

GREENSTAR ASSESSMENT CRITERIA		SCORE (%)
1	Management	7
2	Indoor Environment Quality	18
3	Energy	18
4	Transport	10
5	Water	11
6	Materials	18
7	Land use and ecology	6
8	Releases	9
9	Innovation	3

Founded in 1998 under the leadership of 'Natural Resources Canada' with the participation of 14 countries, GBtool came under the control of IISBEE (International Initiative for a Sustainable Built Environment) in 2002, was named SBtool, and became a multinational evaluation method conducted in partnership with 21 countries today (Odaman Kaya, 2012). The SBtool certification system, which is a general framework for assessing the sustainable performance of buildings and projects, takes into account the environmental factors of specific regions and areas. The evaluation criteria can be removed or reduced at certain weights in the system, provided that the necessary information is provided. The weightings can be modified up to a certain level and partially by authorized third parties and may be regulated according to local criteria (Nils, 2011). According to the SBTool certification system, the environmental performance of buildings is evaluated over 100 points within the scope of seven different assessment criteria. These criteria and the scores for each criterion are given in Table 7.5 (Nils, 2007).

Table 7.5. SBTool assessment criteria and scores

SBTool ASSESSMENT CRITERIA		SCORE (%)
1	Site Location, project planning, and development	8
2	Energy and resource consumption	22
3	Environmental Loadings	26
4	Indoor Environmental Quality	22
5	Service Quality	15
6	Social and Economic Aspects	5
7	Cultural and Perceptual Aspects	2

Another certification system is the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE), released in 2004 by the Japan Green Building Council (JaGBC) and the Japan Sustainable Building Consortium (URL-11). The CASBEE certification system, which is extremely complex in terms of application method and documentation system, is not suitable for use in different countries because its language is Japanese, and it only takes its region into account. The assessment criteria for the system are given in Table 7.6, but the scoring information for the criteria is not available (Köteşli, 2013).

Table 7.6. CASBEE assessment criteria (URL-12)

CASBEE ASSESSMENT CRITERIA			
Construction Environment Quality (Q)		Environmental Loadings (L)	
Q1	Indoor environment	LR1	Energy
Q2	Quality of service	LR2	Resources and material
Q3	Outdoor environment on site	LR3	Off-site environment

DGNB (German Sustainable Building Council System - Deutsche Gesellschaft für nachhaltiges Bauen e.V) is a system created in 2008 in partnership with the German Green Building Council and the Federal Ministry of Transport, Building and Urban Relations (URL-13) to be used in the planning and evaluation of buildings prioritizing quality. In the DGNB, an internationally viable system, buildings are evaluated throughout their entire life cycle. The system, with its flexible structure, allows the application of different types of buildings and the creation of country-specific criteria, evaluates economic, socio-cultural, and functional issues as well as ecological (URL-14). According to the DGNB certification system, the environmental performance of buildings is evaluated over percentage points within the scope of six different assessment criteria. The calculations are made with the help of a combination of evaluation for six criteria. A calculation is made based on the total percentage point weight of the top five criteria for the overall project, as well as the qualification criteria for the location. These assessment criteria and percentage points for each criterion are given in Table 7.7 (URL-15).

Table 7.7. DGNB assessment criteria and scores

DGNB ASSESSMENT CRITERIA		SCORE (%) For Buildings	SCORE (%) For Urban Areas
1	Environmental quality	22.5%	22.5%
2	Economic quality	22.5%	22.5%
3	Sociocultural and functional quality	22.5%	22.5%
4	Technical quality	22.5%	22.5%
5	Process quality	10%	10%
6	Site quality	100%	100%

Based on the worries about the future of the world that environmental problems - began with the Industrial Revolution and emerged as a result of rapidly evolving processes - has created and the assumption that "one who has the energy will have everything," it has gained importance that the energy needed be uninterrupted, reliable, clean, and inexpensive and the sources of energy be diversified. On the other hand, while aiming to meet the needs of a rapidly growing population and changing living culture, built environments, that were almost randomly created, continued to develop unplanned and unqualified due to the different effects and dynamics they were subjected to every day, even reaching dimensions that threatened the future of the world. Built environments, which have an important share in the increase in the rate of CO_2 emission throughout the design, construction, use, demolition, and/or recycling phases, environmental impacts, and consumption of energy sources, have been weak in terms of especially energy efficiency with their developments that stand against and destroy the nature (Beyhan, 2018). In this context, the problems related to energy supply and provision and ensuring its continuity were brought to the agenda with damages to the ecosystem and energy crises, have attracted the attention of the states in the world, and it has been decided that there was a need for measures that affect the building sector more than enough. In order to reach solutions to take the relevant measures, common international goals have been set and the generation process of binding regulations has started.

Besides the requirements of user's health and comfort in a built environment, comprehensive legislative regulations have been developed on energy conservation, reducing all negative environmental effects including carbon footprints of buildings, and use of renewable energy sources, and standards and guidance documents have been prepared in which criteria and limits were set forth. Interstate agreements, unions, and changing sensitivities have been realized over time as a result of these developments occurred within the framework of needs. The EU, which is the largest energy buyer in the world, has played the most important role and has been a pioneer in the creation of energy and environmental policies regarding its increasing dependence on energy and resource needs and its having energy sources. The concept of "sustainable development" in context of developing environmental and energy strategies has

been set forth, the process started with the Brundtland Report in 1987, and the struggle on global warming and climate change started thanks to the Kyoto Protocol, which was signed in 1997 with multinational participation and has gained momentum with the preparation of the action plan expressed as "20-20-20" targets. At this point, the concept of "nearly zero energy building" has started to be adopted, and even "zero energy buildings" and "positive energy buildings" have been realized in applications by taking their place on the agenda. In particular, ensuring zero energy levels and increasing the use of renewable energy sources by limiting the use of fossil fuels has been of particular importance.

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CONCLUSION

The EU Project KA2 Strategic Partnerships coordinated by Gazi University is intended to increase young people's knowledge about the issues of "Energy, Energy Problems, and Energy-efficient Built Environments", raising their awareness of the relationship between energy and built environments, which have become a global problem. In line with the said purpose, this book was written in the form of the second intellectual output as a fundamental reference document for all training courses, activities and visual presentations (third and fourth intellectual outputs).

In drawing up the content of the book, attention was paid to include conceptual and technical information on energy issues, environmental impacts and sustainable approaches of built environments. In this context, it is aimed to raise the awareness of future generations who will become users or decision-makers of the built environments. The subjects in the book were turned into training modules accessible in a remote education process. Prepared by audiovisual presentation techniques, the training modules include courses and tests where participants can test their knowledge. The training modules will be published as "e-learning" on the project's official website to be built in the course of the project.

Young participants reaching the second intellectual output and completing the training are expected to be well informed about sustainability, climate change, ecology, greenhouse effect, global warming, carbon footprint, environmental impacts, energy-efficient built environments, 3R notion, renewable energy, zero-energy buildings, building certification systems and related regulations, and to question the build environments in which they will live in the future, maintain high expectations, and develop behaviors as part of their solution approach as they become more interested in the matter.

Subjects and contents of the activity cards (third intellectual output) and videos to be prepared at the upcoming stages of the project will be designed as part of this intellectual output. This is expected to reinforce the knowledge gained by the participants at the training stage by games, activities, experiences, sharing activities and videos appealing to their audiovisual memory.