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BUILDING RATING SYSTEMS IN UKRAINE – A COMPARATIVE ANALYSIS BETWEEN LEED AND ENERGY CERTIFICATION IN UKRAINE

Abstract

This article presents a comparative analysis between LEED and energy certification in Ukraine. In this study, each of them is analyzed under the aspects of certification process, ecological impact and the variety of categories. SWOT method is further applied to extract the strengths, weaknesses, opportunities and threats of each of the rating system in a direct and indirect manner, making it clearer to choose among various options when considering the individual needs of each project variety of categories.

Keywords: building energy performance, energy certificate, green building certification, LEED.

1. Introduction

All buildings are designed, planned, constructed and managed according to certain codes and regulations, governed by experts and government bodies for human's safety and comfort. Certification methods are different in different countries and have own main goals and points. For economy of energy use and reducing ecological impact from energy consumption the methods of certification can be improved by scientific development and experience of other countries. In Ukraine the development of the main provisions and norms, the purpose of which is to reduce energy consumption in buildings, has begun in 2016. It was reported by the Ukrainian Association of Energy Service Companies. In the first half of 2017, with the participation of the State Agency on Energy Efficiency, the development of a draft law on energy efficiency of buildings was conducted [1]. Its main provisions were aimed at creating conditions for the rational consumption of energy resources in them.The Law "On Energy Efficiency of Buildings" No.2118-VIII was adopted on 22.06.2017 [2]. It defines the legal, socio-economic and organizational framework for activities in the field of ensuring the energy efficiency of buildings and is aimed at reducing energy consumption in buildings. It entered into force on July 23, 2018. The law provides for the main energy efficient measures in buildings, the regulatory framework for independent monitoring of energy performance certificates for buildings, etc. From July 1, 2019 energy certification is mandatory for a certain list of objects. Energy certification has to be carried out only by certified energy auditors to ensure the appropriate level of results obtained [1].

The Energy Efficiency Directive (EED 2012) and the Energy Performance of Buildings Directive (EPBD 2010) are the main European pieces of legislation for reaching energy efficiency.The Article 7 of the EED defines that each Member State (MS) must develop an Energy Efficiency Obligation (EEO) scheme, in order to achieve cumulative energy saving targets from 1st January 2014 to 31st December 2020.The certification of buildings has shown itself to be reasonable and is successfully working in the European Union. Among the EU countries in which they are used are Germany, France, Italy, Norway, Sweden, Hungary, Latvia, Lithuania, and Estonia [3]. In Ukraine, it is now proposed to conduct energy audits of buildings, the results of which have to be enshrined in the energy certificates of a building. The energy certificate of a building is a document that contains general information about the building, its correspondence to the minimum requirements, and class of energy efficiency as well as the recommendations for increasing it, if needed.

Building assessment tools are being developed worldwide with a considerable amount of success, one of them is the Leadership in Energy and Environmental Design (LEED). These

assessment tools provide an effective framework to measure the environmental performance of the building and construction process. Considerable research has been put into development of effective assessment tools for different localities [4].

This article compares 2 types for building certification: Leadership in Energy and Environmental Design (LEED) and Ukrainian certification of energy efficiency of buildings.

Nomenclature

LEED - Leadership in Energy and Environmental Design.

SWOT - Strengths, Weaknesses, Opportunities, and Threats.

2. Purpose and objectives

Extensive review has been done on the assessment documentations of the Ukrainian certification system (Energy certificate), and LEED in order to understand how each of them works and operates. To enable the comparison, energy and ecological aspects are considered. A SWOT analysis is further carried out in order to know how each of the two building rating systems positions itself, to evaluate and design strategies. In a simple way, it shows how a business has positioned itself in relation to the rest of the industry and on its own. The framework is composed of strengths, weaknesses, opportunities and threats.

The article aims to identify the main disadvantages and advantages of certification methods.

3. Material and research results

Description of considered certification types

LEED, which stands for Leadership in Energy and Environmental Design, is a certification program focused primarily on new, commercial-building projects and based upon a points system. To earn LEED certification, project teams must earn points outlined in the rating system by adhering to prerequisites and credits across nine measurements for building excellence from integrative processes to building materials; to indoor air quality [4].

LEED consists of nine categories namely: integration process, location and transportation, sustainable site, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation in design, and regional priority [1]. Here, building grades are classified as follows: Certified (40-49points), Silver (50-59 points), Gold (60-79 points), and Platinum (80-above points) [4].

Energy certificate in Ukraine is established by a Law of Ukraine “About the energy efficiency of buildings” (Verkhovna Rada, Bulletin, 2017, No. 33, p. 359). This Law defines the legal, socio-economic and organizational principles of activity in the field of energy efficiency of buildings and aims at reducing energy consumption in buildings.

Energy efficiency is the main ratio in Ukrainian energy certificate of building. It is divided into classes that show how efficiently a building consumes energy during its operation.Class A is the most efficient building.Class BC -high energy efficiency.Class D - normal energy efficiency.Class E-F-G - low energy efficiency [2].

The Law of Ukraine “On energy efficiency of buildings” was adopted on June 26, 2017 and entered into force on July 23, 2018. The Law draws special attention to the instrument of the energy certificate of buildings [1].

Having an energy certificate on the purchase or lease of premises is just as important as when we buy electronics and look through its energy efficiency class. Each time we choose an electric device in a store, we are interested in the amount of electricity it consumes, and, usually, we choose a device with energy consumption of class A. The same idea is applied in the sphere of real estate – the less energy is spent on housing, the less are the expenditures on communal services, the higher are chances to sell or lease the premises.

According to the Law, from July 1, 2019 the provisions shall be brought into action on mandatory energy efficiency certification for the following buildings:

1) construction objects (new construction, reconstruction, capital repair), which according to the class of consequences (liability) are objects with average (CC2) and significant (CC3)

consequences, which are determined in accordance with the Law of Ukraine "On the regulation of urban development activity";

2) state-owned buildings with a heated area of more than 250 square meters, frequently visited premises, and in all premises where state authorities are located;

3) buildings with a heated area of more than 250 square meters, in all premises where municipal offices are located (in the case of the thermal modernization of such buildings);

4) buildings where thermal modernization is carried out, for which state support has been granted and which results in achieving a class of energy efficiency for the building not lower than the minimum requirements for the energy efficiency of the building [2].

In order to establish an explicit understanding of these systems, each is examined comprehensively highlighting their respective strengths and potential as listed in Table 1 and described in what follows.

Each certificate system frames the rating categories in different areas. For this study, categories of energy efficiency and ecological impact are listed for the two building rating systems as below Table 1. Scoring is applied in all the certifications that has requirements as to the related category.

Table 1. Different categories of the certification systems

Category	Energy certificate (Ukraine)	LEED
Sustainable site and Ecology		
Ecological status		
Biodiversity protection	-	+
Contaminated Land	-	+
Enhancing site Ecology	-	+
Ecological impact	+	+
Construction site		
Site protection	-	+
Site selection	-	+
Site Development	-	+
Energy		
Energy consumption	+	+
Renewable energy strategy	+	+
Energy performance		
HVAC	+	+
Lighting (internal)	+	-
Lighting (external)	-	+
Ventilation	+	+
Heat transmission	+	+
Operational		
Energy monitoring	+	+
Optimizing energy	+	+
CO2 reduction	+	+
Water and Waste management		
Water		
Water consumption	+	+
Indoor water reduction	+	+
Outdoor water reduction	-	+
Irrigation system	-	+
Rain water harvesting	-	+
Water conservation/metering	-	+
Grey water recycling	-	+

Waste water technology	-	+
Waste		
Construction waste management	-	+
Waste treatment	-	+
Recycling Activities	-	+
Materials		
Low environmental impact materials	+	+
Renewable natural materials	-	+
Insulation	+	+
Source of raw material	-	+
Re –use of structural material	-	+
Use of non- structural frame material	-	+
Use of finishing material	+	+
Efficient use of material over life cycle	+	+
Economic Aspect		
Operation and maintenance cost	+	+
Pollution		
Prevention of refrigerant leakage	-	+
NOx emission	-	+
CO2 emission	+	+
Night light	-	+
Noise pollution	-	+
Watercourse pollution	-	+
Natural disasters	-	+
Indoor Environment & Health		
Ventilation		
CO2 monitoring	+	+
Provision of natural ventilation	+	+
Ventilation system	+	+
Fresh air supply	+	+
Lighting		
Daylight	+	+
View out and Glare control	-	+
Lighting control	-	+
Illumination level	+	+
Noise and acoustics		
Noise level	-	+
Sound insulation	-	-
Contaminate level		
Volatile organic compounds (VOC)	-	+
Microbiological contaminate level	-	+
Thermal comfort		
Cooling/heating and humidity control	+	+
Proper zoned control	+	+
Management		
Commissioning	-	+

Construction site management	-	-
Consultancy	-	-
User guide	-	-
Security	-	-

SWOT-analysis of considered certification types

SWOT analysis has been widely used as the basis of management and strategic planning in several areas of activity, and the case of the construction and energy efficiency sectors is no exception. The companies and professionals use this analysis to make an environmental analysis, since it consists of making a complete diagnosis about the business and the environment that surrounds. It can be used for any type of scenario analysis, from the creation a new project to the management of a multinational. This is an example of a simple system to position or verify the strategic position of the company/institution in the environment in question.The information was summarized based on criticism of leading organizations in Ukraine and Europe [5], [6].SWOT Analysis of Ukrainian energy certificate and LEED rating systems are presented in Table 1 and Table 2 respectively.

Table 2. SWOT Analysis of Ukrainian energy certificate rating system

Energy certificate (Ukraine)	
Strengths 1. Focused on energy aspects. 2. Adapted to Ukrainian legislation. 3. Evaluates many inner buildings parameters. 4. Designed to meet the local needs of Ukrainian people. 5. Fast and cheap certification. 6. Ecological impact is included.	**Weaknesses** 1. Ecological impact has only Co2 parameter. 2. Lack of material requirement for special buildings. 3. Only for post-constructed buildings. 4. Not suitable for all types of buildings. 5. Not mandatory for many types of building and has a lot of limitation (area, outside facades, building`s destination). 6. No single database of certificates.
Opportunities Has strong place in Ukrainian market, provides fast certification of all residential and administrative buildings.	**Threats** 1. It is no world market recognized and strong in business. 2. Data presents in short version (results of calculations, rather than sending documents and excel forms). 3. Corruption risks (require a significant increase in the number of employees involved in the inspections). 4. No specialized software with standardized input forms and a calculation module to make a quality test is almost impossible.

Table 3. SWOT Analysis of LEED rating system

LEED	
Strengths 1. Market recognized. 2. Global adapted for different realities. 3. Provides active training for stakeholders. 4. Conduct detailed analysis.	**Weaknesses** 1. No follow up post-construction phase of building. 2. Expensive.

5. Evaluated the building from the construction stage. 6. Strongly focused on energy aspects. 7. LEED draws attention to the benefits of reusing old buildings.	3. Points for energy conservation are based on a computer energy model and not on actual post-occupancy energy use. 4. LEED is indiscriminate in its weighting of credit points.
Opportunities Thanks for huge amount of different aspects can rise occupants' comfort, to point attention on waste control, to implement more clean energy.	**Threats** 1. Many bureaucracies, long and expensive procedure of certification. 2. LEED-certified buildings actually consumed more energy per square foot than comparable non-LEED buildings (in the U.S.). For Ukraine this information is unavailable.

4. Conclusions

Today it becomes fundamental to be aware of the differences and also advantages and disadvantages of one certificate for another since the many differences can bring benefits when it comes to the certification of a building. A careful evaluation should be made to understand which of the certificates available in the market can bring more benefits, both for the building itself, for investors, and for local society and daily users.

For further analysis, advantages and disadvantages pointing the quantitative comparison on typical models and objects is needed, to find out the possible reasons for the decrease in energy efficiency of LEED.

Literature

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