

# ОСНОВИ ПРИРОДОКОРИСТУВАННЯ NATURAL RESOURCES

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## FRENCH GREEN BUILDING RATING SYSTEMS

***Abstract.** Most of the Green Building Rating Systems have similarities in common more than differences. All of these systems are trying to integrate issues of environmental protection and health in the building. French Haute Qualité Environnementale (HQE) system identifies 14 environmental targets for building divided into four groups of objectives: site and construction, management, health, comfort. These targets have implications for all steps of the design process and production of the building and also taking into account the land, the landscape, the neighborhood and the transportation systems. The green building construction is a global issue that can find regional solutions. French system is suitable for Ukraine mentality, because for current situation we need new technologies and modern knowledge to developing green building sector. HQE has better innovative extension of the concept to the urban planning operations in compare with other world's leading standards for Green Buildings assessment systems.*

***Key words:** green building; certifications rating system; environmental safety*

### Introduction

Green Building, also known as Green Construction or Sustainable Building, is a relatively recent concept. From the prevailing classical building design concerns of economy, utility, durability and comfort, the new concept came to initiate an operational response to the need to include long term development criteria that integrate the environment concerns in the buildings' projects, and a label to denote an "environmentally friendly" process [1]. Buildings account for a large amount of

land use, energy and water consumption, in addition to air and atmosphere alteration. Considering the statistics and the impact of the built environment on human health as well as the natural environment, reducing the amount of natural resources consumed by the buildings industry and the amount of pollution given off is seen as critical to achieve sustainability. Green Buildings are expected to reduce greenhouse gases, save the natural resources and meet the users' justifiable demand for more comfort and safety; in addition to their promising projected value within the global economy [3].

Outstripping the sectors of transport and industry, buildings are also responsible of air and atmosphere alteration by 39 percent of the carbon dioxide emission [9]. In the United States buildings use about 40 percent of the total energy consumed, and account for 13.6 percent of water (per day) and approximately 72 percent of electricity consumption [8]. In France, the building construction sector consumes about 43% of final energy (31% for the transport sector) and accounts for nearly a quarter of emissions of greenhouse gas. Each country has traditions, history, rules and a lot of things that make their houses unique, even in one country we can find many differences between regions. The united nation's statistics show that, unfortunately, the rest of the world, with different proportions, does not break the rule and things are worst elsewhere, especially in the growing economies [3].

The issue related to the reduction of energy consumption in building sector is firstly related to ecology: the main goal is to reduce emissions of greenhouse gases to protect the planet against climate change. The priority given on the control of the energy consumption has two targets: limit the use of the fossil energies, because the global reserves of fossil fuel fall down sharply, and strengthen the purchasing power by lower expenses related to energy consumption [2]. Reducing the amount of natural resources consumed by the buildings and the amount of pollution given off is seen as a crucial challenge for and a critical key to achieve sustainability. The international consensus and commitment to a sustainable development and the obligation to find innovative solutions to the rarefaction of the natural resources and control the greenhouse effect, combined to the users' justifiable demand for more comfort and safety is largely considered as the main challenge of the 21st century. From an environmental point of view, the benefits of a raise in Green Building practices are well worth the efforts to grant. Green Buildings are expected to reduce 24 to 50 percent of the energy use, 40 percent of the water consumption, 33 to 39 percent of the CO<sub>2</sub> emission and up to 70 percent of the total solid waste [6]. Moreover, from an economic point of view, the projected Green Buildings value is substantially promising. Besides, the environmental impact of buildings is often underestimated, while the perceived costs of green buildings are overestimated. A survey by the World Business Council for Sustainable Development found that green costs are overestimated by 300 percent, as key players in real estate and construction estimate the additional cost at 17 percent above conventional construction, more than triple the true average cost difference of about 5 percent [10].

## **Purpose of Research**

The objective is to integrate issues of environmental protection and health in the building sector of Ukraine with using the best positive practical experience of France. It allows the builders to promote their efforts to reduce the impact of their operations on the environment and health, and to maximize comfort.

## Result of Research

In France the Consumer Code requires a separation between the certification agency and the company that produced the certified product. There are two main organizations that lead the green building in France. In one hand there is the French government, who passed laws on the energy efficiency of the buildings, called “règlementation thermique (RT)” (the French words for thermal regulation rules) and on the other hand, with a wider approach which take into account all the aspects of the sustainable development, there is the “Haute Qualité Environnementale” (HQE) system, which has been developed in the 1990s by the HQE association [5]. The first project with a HQE approach was initiated in 1993, as a part of the program Ecology and Housing. The objective was to integrate issues of environmental protection and health in the building sector [7].

In order to improve the representation and to promote the green building construction in France, some French associations and firms have created the French Green Building Council, which is a member of the World Green Building Council. The main objectives of the council are to promote the green construction toward the public and help the professionals who want to develop green building projects. Beginning in the 1980s, labels, standards, certifications, and references have been developed in France, as in the rest of the world. Obtaining a certification or a label is a voluntary process initiated by a client or a developer who wants the quality of its constructions recognized. These labels and certifications are indicators for a buyer or prospective tenant, in terms of comfort, saving costs and environmental protection. Today, many building owners and developers are concerned about the environmental and energy challenges mentioned above. The referential of certifications and labels serve as guides for those who wish to improve their skills in environmental and energy quality [2].

***The French HQE initiative.*** In 1995 a manufacturers' association of construction products (AIMCC – Association des Industries de Produits de Construction) registered the trademark (HQE®) which stands for “Haute Qualité Environnementale” (High Environmental Quality), and created the homonymous association (“Association pour la Haute Qualité Environnementale”) to promote a global approach that ensures better control of a building's life cycle from the design stage to construction, operation, maintenance, renovation, and deconstruction. Such objective would be achieved, mainly, by monitoring the impacts on the external environment (Ecoconstruction, Eco-management) and creating a healthy and comfortable indoors environment (Hygrometric, Acoustic and Visual comfort as well as areas, air and water quality). The association consists of a number of public or collective bodies (associations, labor unions) representing all the actors of the building sector: project owners, consultants, contractors, manufacturers of construction products, experts, etc., organized in five middle colleges within the board of directors. Members are organized in working groups to elaborate reference tables, produce thematic states of the knowledge, organize working sessions and promote the French approach in the international technical exchange circles, or with the standardization organizations such as AFNOR, CEN (the European Committee for Standardization), and ISO [3].

It is very important to understand that the HQE is not a rating system like the LEED or the BREEAM, but it is only an approach. Since 2005, if they match the approach, commercial building can receive a NF-HQE certification. It allows the builders to promote their efforts to reduce the impact of their operations on the environment and health, and to maximize comfort. The HQE approach aims to satisfy three requirements: obtaining a healthy indoor environment and comfortable for the occupants, controlling the impact of the building on its external environment, and preserving the natural resources by optimizing their use. This approach is also part of the current priority of controlling consumption energy and greenhouse gas emissions, by integrating of energy performance thresholds from the beginning of the building design [2].

Principles of the French HQE® Approach HQE® approach is a standard for Green Buildings in France designed to improve the environmental quality of the built environment. It leads to a certification that approves the consideration of environmental issues in the construction process of a building. HQE® helps contracting authorities, architects, manufacturers and entrepreneurs control the building impact on the outdoors environment and create a healthy and comfortable indoors environment for their clients. It can be used as a criterion for investors and property developers to monitor the financial performance of a building or a portfolio. HQE is applicable to all types of new and existing buildings in the residential, tertiary and industrial sectors [3]. To supervise the implementation of environmental quality in building construction, the HQE system does not provide a ranking system as the LEED or the BREEAM, but instead gives an environmental profile [2].

The Haute Qualité Environnementale standard, referred to by its abbreviation HQE™, was developed in 1994 in France by the HQE™ association [5]. This association supports stakeholders, designers, partners, developers, and users during a project's phases and aims to guarantee a high environmental quality of buildings. HQE™ covers buildings throughout their life cycle, that is, throughout their design, construction, operation, and renovation. It is addressed to nonresidential and residential buildings, and detached houses. Furthermore, a specific scheme for the management system of urban planning and development projects is also available. The environmental performance requirements are organized into four topics that together include 14 categories. Topics are almost the same for all building types, but the targets are arranged differently for residential buildings and nonresidential buildings (i.e., commercial, administrative, and service buildings). The system identifies 14 environmental targets divided into four groups of objectives: site and construction, management, health, comfort. These 14 targets have implications for all steps of the design process and production of the building (fig. 1). Today, the HQE expands beyond the 14 targets, taking into account the land, the landscape, the neighborhood and the transportation systems [2]. In addition to the 14 targets and their sub-targets (not included in table 1), the following Environmental Indicators are also assessed: 1) Consumption of non-renewable energy resources indicator; 2) Climate change indicator; 3) Water consumption indicator; 4) Waste production indicator [5].

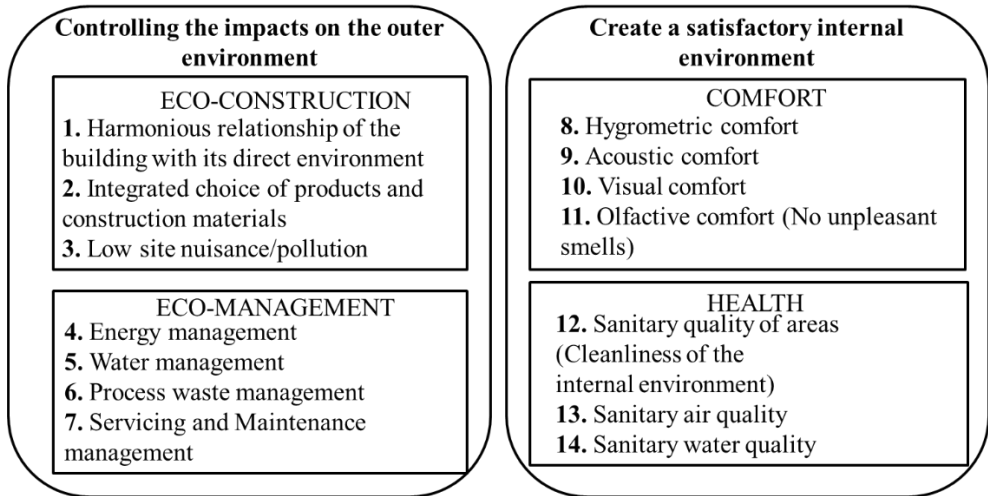


Fig. 1 – The main targets of the HQE approach

The conventional aspect of this grid is not always suited to the daily practice of construction, but it nevertheless represents a basic tool, especially for certifications that validate the environmental quality of buildings. Anyway, the application of the approach is always a matter of compromise, in which the owner must be involved.

**HQE certification.** The HQE Association has developed many schemes, exploitable in France and abroad. It is structured to have three organizations in charge of delivering national evaluations (Certivèa, Cerqual, and Cèquami) and one for supporting the evaluation across the world [5]. A building project obtains an assessment for each target expressed according to three ordinal levels: basic, performing, and high Performing. To be certified, a building must achieve the high performing level in at least three categories and the basic level in a maximum of seven categories. This rating system does not weight each category by a weighting factor, because they are considered to have the same importance throughout the assessment framework.

To develop the approach, the French government gives financial incentives reducing the taxes to the owners, builders, associations, who follow the HQE approach to design their building, residential or commercial. The NF-HQE certification is for all commercial buildings, whether public or private, and take into account the phases of planning, design and implementation. The NF Commercial Buildings HQE already covers most sectors of commercial buildings. It will be gradually extended to new categories such as sports or cultural facilities, which are not yet in the certification system. In order to receive the certification, the commercial building must respect the requirements of the standard concerned (determined by the future use of the building) developed by Certivèa. Certivèa validates the certification, after consultation with the HQE Association and a committee composed of representatives of building owners, users of commercial buildings, and actors in the construction sector and construction experts [2].

FIDIC, the International Federation of Consulting Engineers (the acronym stands for the French version of the name) represents globally the consulting engineering industry. The Federation promotes the business interest of firms supplying technology-based intellectual services for the built and natural environment and

recognizes that the work of the consulting engineering industry is critical to the achievement of sustainable development of the society and the environment. FIDIC has issued a number of Policy Statements about issues relevant to the consulting engineering firms (particularly relevant to clients and financing agencies in developing countries). The Project Sustainability Management Guidelines (PSM) published by the International Federation of Consulting Engineers (FIDIC) were created in order to assist project engineers and other stakeholders in setting sustainable development goals for their projects. The process is also intended to allow the alignment of project goals with local conditions and priorities and to assist those involved in managing projects to measure and verify their progress [3].

There are some other labels, which are used in France, like the German label Passivhaus, the Swiss label Minergie, or the French Effinergie. These certifications have been designed to supervise and assist builders who want to make their buildings particularly energy efficient. To obtain one of these labels, the project managers have to follow the referential of the label, and ask the certification to an accredited organism. The requirements of these labels are expressed in terms of objectives and limits not to be exceeded, but do not give any solutions to reach these targets. They require neither constructive choices, or materials, or techniques, or energies, in order to allow any freedom of design and innovation in project management (architect and engineering). However, as shown by examples of achievements, materials and applied technology are often the same, regardless of the certification. The additional investment costs to reach these performances are about 7 to 15% compared to a building following the RT 2005 requirements. But the investment is quickly recouped offset by the savings of energy consumption [2].

The Environmental Management System (EMS) constitutes the Organizational aspect which defines the tools required to pursue the operation and to structure the interfacing between the various parties involved in the project. The EMS, closely tied to the International System of Environmental Management ISO 14001, includes an examination of the site, the objectives of the operation and the needs of the future users. The building owner elaborates, on the base of the building plans and scheduling, the implementation and the oversight of the construction, in order to manage the quality of the processes. The EMS is periodically internally evaluated in order to make sure the operations are linked with the goals. It aims to provide a framework for builders and provide tools for decision making. The ISO/TS 21931, 2006 is a framework technical specification for “methods of assessment for environmental performance of construction works”. The specification details and follows the principles set out in the ISO 14000 series of standards [3].

The latest version of the French thermal regulation, the RT 2005, has been passed to meet these goals. It is applicable to all building permits in the residential (housing) sector and non-residential (commercial) sector, since the 1st of September 2006. It strengthens the control requirements of the energy needs for new constructions of 15% compared to the previous thermal regulation law (the RT 2000) [4]. The next thermal regulation, the RT 2012, strengthen the thermal requirements gradually in order to reach the target of 40% reduction of energy consumption in 2020. The RT2012, is an addition to the RT2005, it insists on four main energy efficient systems and oblige to: 1) Reduce significantly thermal bridges (exterior insulation); 2) Use condensing boiler to produce hot water; 3) Use heat pumps; 4) Continue the development of renewable energies, in particular for heating. The buildings that are more efficient than the requirements of the thermal regulation may be certified by

one of the five levels of the HPE label (Haute Performance Energétique – High energy efficiency). The BBC label (Bâtiment basse consommation – Low consumption building): Global energy consumption is equal to or less than 50 kWh/m<sup>2</sup> year. The Effinergie label can be validated by obtaining the BBC level [2].

The green building construction is a global issue that can find regional solutions. If the climatic warming and all the environmental issues we face are global and touch any countries, the solutions to reach a sustainable development must take into account regional specificities, such as the climate, the local raw materials, but also the local governments, the knowledge and capacities of the local firms. Any solution that is viable in one country may be not adapted in another. That is why organizations of green buildings, if they want to export their certifications abroad, have to adapt their referential to the market targeted. The green building construction sector is in constant evolution in the world, and we can hope that the green building will become the standard of construction, and not only an exception, for the health of the Earth and mankind [2]. The findings of the comparison the French HQE and the American LEED assessment systems show an advantage for the French system in addition to its innovative extension of the concept to the urban planning operations [3].

Because the development of our cities and housing environment does not comply any more with the current requirements of sustainability, it is necessary to develop the practices of the town planning. Furthermore, the only juxtaposition of Green Buildings does not make a sustainable city and the environmental performance of a building has no value unless it joins a full urban planning project. This new vision needs an evolution at the level of the urban environmental performance, which has to be conducted in a global way including the practices' level. The vision and methods of town planning actors have to be modified in depth to achieve this new challenge. From this point of view the French HQE is much further ahead in greening the environment than the American LEED by extending the environmental quality to the urban development. This is definitely the great innovation of the French assessment methodology [3].

## **Conclusion**

Most of the Green Building Rating Systems (GBRS) have similarities in common more than differences. This is due to the fact that all of these systems are trying to integrate issues of environmental protection and health in the building. Therefore, the principles are and should be nearly the same to design policies, develop approaches and undertake actions in order to reduce the overall impact of the built environment on human health as well as the natural environment. Certifications are indicators for a buyer or prospective tenant, in terms of comfort, saving costs and environmental respect. It allows the builders to promote their efforts to reduce the impact of their operations on the environment and health, and to maximize comfort. GBRSs are assessing the buildings according to environmental and economic issues today. In addition to the environmental and economic aspects, there is also the social aspect of sustainability. The issue related to the reduction of energy consumption in building sector is firstly related to ecology: the main goal is to reduce emissions of greenhouse gases to protect the planet against climate change. French Haute Qualité Environnementale (HQE) system is not a rating system like the LEED or the BREEAM, but it is only an approach. The system identifies 14 environmental targets divided into four groups of objectives: site and construction, management, health,

comfort. These 14 targets have implications for all steps of the design process and production of the building. Today, the HQE expands beyond the 14 targets, taking into account the land, the landscape, the neighborhood and the transportation systems. The green building construction is a global issue that can find regional solutions. HQE has an advantage in the number of environmental sub-issues evaluated compared to other GBRSS and is much further ahead the consideration of the urban development operations is compared. Seems that French system is suitable for Ukraine mentality, because it is only an approach and for current situation we need new technologies and modern knowledge to developing green building sector, but it is too early implement certifications rating system. French system has better innovative extension of the concept to the urban planning operations in compare with other world's leading standards for Green Buildings assessment systems.

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### **Т.І. Кривомаз, А. Мішо, Д.В.Варавін, А.Р. Перебинос ФРАНЦУЗЬКА РЕЙТИНГОВА СИСТЕМА ЗЕЛЕНОГО БУДІВНИЦТВА**

**Анотація.** Більшість рейтингових систем зеленого будівництва схожі по суті, оскільки всі вони намагаються інтегрувати питання охорони навколишнього середовища і здоров'я людей в процес будівництва. Французька система Високої якості навколишнього середовища (Haute Qualité Environnementale – HQE) визначає 14 екологічних мети будівництва, розділених на чотири групи: місце будівництва, управління, здоров'я, комфорт. Ці цілі впливають на всі етапи процесу проектування і будівництва, а також враховують землекористування, ландшафти, інфраструктуру і транспортні системи. Зелене будівництво вирішує глобальні проблеми, використовуючи при цьому регіональні рішення. Французька система підходить для українського менталітету, тому що для нинішньої ситуації необхідні нові технології і



сучасні знання для розвитку зеленого будівництва в Україні. HQE має краще інноваційне розширення концепції для містобудівних операцій в порівнянні з іншими світовими стандартами систем оцінки зеленого будівництва.

**Ключові слова:** зелене будівництво; сертифікаційна рейтингова система; екологічна безпека

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