SUSTAINABLE BUILDING IN LATVIA: DEVELOPMENT AND FUTURE CHALLENGES

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Sustainable building has become very popular throughout the world. Sustainable building is the application of sustainable development in the construction industry. Construction projects and activities are, in general, associated with a wide range of environmental impacts. Targets of sustainable buildings promotion are protecting the environment, using less energy through natural ventilation provisions and daylight utilization, developing better waste management and taking water conservation into account. Architectural and building design, electrical and mechanical systems, and building management have to be upgraded. Therefore the principles of sustainable development should be adopted during construction just like in any other industrial sector. To realize sustainable development in the construction industry, green building assessment system, which is designed to promote environmental awareness amongst built environment professionals, have been perceived as effective tools. However, when choosing green building assessment tool, we are usually puzzled either to use an international assessment tool or make a totally new tool. A good assessment tool should be judged according to its potential application. The application of green building assessment tools have been widely accepted as useful way to promote sustainable building. The purpose of this study is to explore and analyze present status of sustainable building and green building assessment in Latvia and to indicate the strategies of its development. Further research needs to be conducted based on this initial journey to promote green building in Latvia. From the authors' point of view, the most effective way is to choose an international tool as a basis and then make a customer-tailored tool according to the situation in the market of Latvia. The analysis shows that the process of sustainable building in Latvia is in a progressive stage of introduction.

***Key words**: Sustainable Building, Green Building, Green Building Assessment, Sustainable Development*

1. INTRODUCTION

The importance of construction in the national socio-economic development is obvious. It affects both the life of an individual and society as a whole as well as the environment and the natural ecological balance. It creates a logistical base in other economic sectors and describes economic development and culture of the country. Thus, reasonable usage of ecological systems and recoverable natural resources, reducing energy consumption, so contributing to sustainable development of the country whilst ensuring quality of buildings and the environment becomes the essential task of the construction industry.

Over the past two decades, due to increasing global environmental awareness, construction activities have had raised serious concerns about their large environmental impacts, which stem from their consumption of materials, many of which are non-renewable. It is estimated that buildings account for about 40 % of the materials entering the world's economy each year and for 25 % of the world's usage of wood. In addition, site construction produces many atmospheric pollutants, and negligence on construction sites may result in the spillage of substances, which are washed away into water sources. Large volumes of waste result from the production, transport, use of construction materials and products. Large amounts of energy are consumed during manufacturing construction products. Emissions to air are created during the transport of these products from the factory to the construction site. It is therefore clear that construction activities can have a large adverse impact upon the environment. This impact may be even more profound when it is taken into the account that the construction site is a temporary production facility, predominantly exposed to outdoor conditions, with a large number of personnel belonging to different companies with very different organizational cultures. As a consequence, production processes take place in a less controlled and more vulnerable environment, when compared to other industrial settings; thus the risk of considerable environmental damage is increased.

Sustainable development is a major concern, and embodies both environmental protection and management. Generally, sustainable development concerns attitudes and judgment to help insure long-term ecological, social and economic growth in society. Applied to development of construction projects, it involves the efficient allocation of resources, minimum energy consumption, low embodied energy intensity in building materials, reuse and recycling, and other mechanisms to achieve effective and efficient short- and long-term use of natural resources. Current environment assessment methods do not adequately and readily consider environmental effects in a single tool and therefore do not assist in the overall assessment of sustainable development.

Since the early 1990s, sustainable construction has been widely accepted in the construction industry all around the world. Building houses to meet the present need, we must take care of not compromising the ability of future generations to meet their needs. The building industry is responsible for a large part of the world's environmental degradation as buildings converge in

themselves major indexes of energy and water consumption, raw material employment and usage of land in order to cope with the services they provide, such as lighting, water and climate control, buildings generate considerable amounts of greenhouse and ozone-depleting gases throughout their life cycles, which will have enormous impacts on nature (Cole, 1999; Cole, 2005; Ding, 2008; Ali and Nsairat, 2009; Chau *et.al*., 2010,). According to World Watch, one-tenth of the global economy is dedicated to constructing, operating and equipping homes and offices. This activity accounts for roughly 40% of the materials flow entering the world economy, with much of the rest destined for roads, bridges and vehicles to connect the buildings. In 1999, the International Council for Research and Innovation in Building and Construction (CIB) published the Agenda 21 on Sustainable Construction, which has clarified the main concepts, aspects and challenges that sustainable development presents to civil construction (CIB,1999).

The concept of Green Building (GB) "encompasses ways of designing, constructing and maintaining buildings to decrease energy and water usage and costs, improve the efficiency and longevity of building systems, and decrease the burdens that buildings impose on the environment and public health."

A building has a long life cycle, so its effect on the environment is a long and continuing issue to consider. The improvement in the performance of buildings with regard to the environment will indeed encourage greater environmental responsibility and place greater value on the welfare of future generations.

Sustainable construction is seen as a way for the construction industry to contribute to the effort to achieve sustainable development.

To realize sustainable development in the construction industry, green building assessment system, which is designed to promote environmental awareness amongst built environment professionals, have been perceived as effective tools. Cole *et al*. (2000) define building environmental assessment methods as tools for evaluating building performance with respect to a broad range of environmental considerations, organized into assessment criteria. That is, building environmental assessment methods have emerged as a means to evaluate building performance across a broad range of environmental considerations.

There are many assessment systems in different countries. It is hard to say that one system is better than the other because they are all designed based on a national background, which induces the limited utilization of these systems. Therefore, development of green building assessment system accepted worldwide has captured considerable attention.

The purpose of the study is to explore and analyze present status of sustainable construction and green building assessment in Latvia and to indicate the strategies of its development.

2. SUSTAINABLE BUILDING

Sustainable building is closely related to the concept of sustainable development.

In 1987, the United Nations released the Brundtland Report, which defines sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs".

According to the Brundtland Report, the concept of sustainable development determines the need for the society to establish and implement such objectives of economic development and welfare level, the implementation of which do not impair the environment and do not endanger survival conditions of the species of flora and fauna not only in one country but all over the world.

Housing is the primary issue for ensuring necessary environment and security level of the activity of human life and individual's existence and at the same time it is one of the indicators of the welfare level of the nation. Since the quality of housing as a whole is determined by the overall standard of living in particular country, then the participation of the state in housing development from a macroeconomic point of view should be regarded as a major contribution to the development of the nation.

Green construction began at the end of the twentieth century in the USA, where at the initiative of the business people first constructions of this type were built.

The term "sustainable construction" is used to describe the application of sustainable development in construction. The basic definition of sustainable construction was formulated in the conference organized by CIB, held in the USA in 1994: its the creation and management of the healthy environment in the construction works and beyond their limits, following the principles of the efficient consumption of resources and environmental friendliness (Šaparauskas, 2001 etc.). This conception also covers the sustainability-ensuring constructional materials, safe construction practice and new technologies.

U.S. Environmental Protection Agency (2009) gives the following definition of green building: "*Green building* (also known as *green construction* or *sustainable building*) refers to a structure and using process that is environmentally responsible and resource-efficient throughout a building's life-cycle: from sitting to design, construction, operation, maintenance, renovation, and demolition. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort".

The concept of sustainable development can be traced to the energy (especially fossil oil) crisis and the environment pollution concern in the 1970s. The green building movement in the USA originated from the need and desire for more energy efficient and environmentally friendly construction practices. There are a number of motives to building green, including environmental, economic, and social benefits.

Conservation of the ecosystems and biodiversity, improvement of the air and water quality, reduction of the amount of solid waste, natural resource conservation and depletion are considered to be the benefits for the environment. Economic development is facilitated by the reduction of building operating expenses, by increasing added value, by providing support to domestic producers and the economy as a whole, by increasing worker productivity and satisfaction, by improving economic indicators of building life-cycle, i.e. economy all time of the usage. In its turn, the society benefits are as follows: better air quality, increased comfort level and healthy living environment, reduced the extra load to the infrastructure, higher quality of life.

Zainul Abidin and Pasquire (2005) have interpreted the principles of sustainability within construction industry as follows:

- Showing concern for people by ensuring they live in a healthy, safe and productive built environment and in harmony with nature.
- Safeguarding the interests of future generations while at the same time, meeting today's needs.
- Evaluating the benefits and costs of the project to society and environment.
- Minimizing damage to the environmental and its resources.
- Improving the quality of buildings and services and promote social cohesiveness.
- Using technology and expert knowledge to seek information and in improving project efficiency and effectiveness.
- Legislating compliance and responsibility.

Green building brings together a vast array of practices and techniques to reduce and ultimately eliminate the impacts of new buildings on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through passive solar, active solar, and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and for reduction of rainwater run-off. Many other techniques, such as using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water, are used as well.

While the practices, or technologies, employed in green building are constantly evolving and may differ from region to region, there are fundamental principles that persist from which the method is derived:

1. Sitting and Structure Design Efficiency,
2. Energy Efficiency,
3. Water Efficiency,
4. Materials Efficiency,
5. Indoor Environmental Quality Enhancement,
6. Operations and Maintenance Optimization,
7. Waste and Toxics Reduction (U.S. Environmental Protection Agency, 2010).

As shown by the practice, in many countries around the world the value of the buildings constructed in a sustainable manner in the property market has on average 16% higher value than ones built in a traditional way. However, they have lower management costs. In such buildings greater number of apartments or office space can be sold. But the rent is about 3% higher than in other buildings. This difference is clearly outweighed by a healthy and comfortable working and living conditions. Sustainable construction is closely related to environmental benefits. This type of buildings (more precisely, the people who dwell therein) while consuming less energy, much less account for today's bogey - CO_2 emissions. Such buildings also reduce the load on the infrastructure and improve air quality as well.

Energy efficiency factors in buildings vary according to geography, climate, building type and location. Currently, there are four types of energy efficiency models of buildings in the world:

Model 1 - Low-energy buildings. Low-energy buildings can be 50% and 0% energy houses (percentage indicates the energy consumption required for maintaining the house, compared to traditionally constructed buildings). Buildings which have 50% energy consumption concept consume half of the heat energy required for the traditionally constructed building. This is achieved mainly through better insulation and window glazing, and ventilation systems with heat return. Zero-energy buildings produce as much energy as they consume. Such buildings are characterized by a number of energy efficiency solutions, for instance, usage of renewable energy such as solar or wind. Since more energy is produced in summer, while its consumption is higher in winter, energy is accumulated, on average, ensuring equitable balance between the amount of energy generated and energy consumed. Although the zero-energy buildings can operate completely independently, to guard against potential volatility of energy consumption usually connection to the local power grid is envisaged as well.

Model 2 – Ultra-low-energy buildings. These are buildings for which the amount of energy consumption necessary for the management is closer to the energy consumption needed for zero-energy house concept.

Model 3– Energy-plus buildings. Planning, energy efficiency, resource use principles for energy-plus buildings are the same as for zero-energy buildings. But in energy-plus buildings there are solutions found on getting more energy than needed for consumption on average per year. In Europe, such a model has recently become very popular - in Germany several pilot projects for such houses has been successfully implemented.

Model 4 – Passive house. Passive house is a building where all year round, regardless of temperature fluctuations in the external environment, a comfortable indoor climate is provided. This can be achieved through a variety of alternative heating solutions and preventing possible heat loss to a maximum. Location of the building in the environment as well as window placement on the south side of the building is essential. For this type of buildings they say that such houses are heated and ventilated by themselves, hence they are called passive. Sometimes this type of construction is

also known as zero-energy buildings. The concept of the passive house adopted in Europe requires that the energy consumption for heating in this type of building is 15 kWh/m². Total energy consumption in such buildings including premise heating, hot water and electricity is 120 kWh/m².

Progress on energy efficiency depends on people in the building industry being aware of the importance of the issue, and then being able and willing to act on it.

Energy Development Guidelines of Latvia for 2007 - 2016 raise a number of objectives aimed at more efficient use of energy:

1) through energy efficiency measures to promote reduction of primary energy consumption in buildings of 1% per year compared with the estimated consumption without implementation of efficiency measures, so the energy intensity in 2010, 2015 and 2020 will be reduced up to 0.35, 0.28 and 0.22 TOE/1000 EUR (2000);

2) to reduce the average specific heat consumption in buildings from 220-250 kWh/m2 per year to 195 kWh/m2 per year in the time period until 2016, but by the year of 2020 reach the average specific heat consumption of 150 kWh/m2 per year.

In order to implement these plans and to obtain the efficient result, it is necessary to fulfill many conditions, including the one – to properly assess the versions of the buildings and their surrounding environment, by applying the internationally acclaimed sustainable building certification systems.

There is no doubt that environmental building assessment methods contribute significantly in achieving the goal of sustainable development within construction. On one hand, it provides a methodological framework to measure and monitor environmental performance of buildings, whilst on the other it alerts the building profession to the importance of sustainable development in the building process.

3. GREEN BUILDING ASSESSMENT SYSTEMS

To enable us to determine whether the thing or phenomenon is good or bad, it is necessary to be measured. This principle is also applicable to sustainable construction.

The primary role of an environmental building assessment method is to provide a comprehensive assessment of the environmental characteristics of a building (Cole 1999) using a common and verifiable set of criteria and targets for building owners and designers to achieve higher environmental standards (Ding 2008). The literature review of green building assessment tools shows a fruitful result. In the past several years, many environmental assessment systems for buildings have been built. Many studies have been conducted within the latter decade, different methodologies for the assessment of buildings have been applied, especially to solve the efficiency of consumption of energy and other resources (Sabapathy et al. 2010; Iwaro and Mwasha 2010; Galvin 2010; Sartori et al. 2009; Filippin and Larsen 2009; Swan and Ugursal 2009; Zavadsakas et al. 2008 a, b;; Balaras et al. 2007, 2005; Forsberg and Malmborg 2004; Flourentzou et al. 2002; Jaggs and Palmer 2000; and many others). Elkington's (1997); Young's (1997), and Kohler's (1999) frameworks to measure sustainability have many similarities, but Kohler (1999) also emphasized the importance of cultural considerations. Ding (2008) has showed very good summary of 21 environmental building performance assessment methods. She summarized the old and new environmental building assessment methods used in different countries, their origin and characteristics. Ali and Nsairat (2009) offer the SABA assessment tool, having taken into account the environmental, social and economic aspects of their country - Jordan.

The internationally acclaimed systems of environmental building assessment methods are oriented towards the energy saving, efficiency of water consumption, reduction of CO2 emission, improvement of indoor quality of life, management of resources and their purposeful consumption.

Most of the environmental building assessment tools cover the building level and based on some form of life-cycle assessment database (Seo et al., 2006). Tools are basically divided in two categories: assessment and rating tools. Assessment tools provide quantitative performance indicators for design alternatives whilst rating tools determine the performance level of a building in stars.

Some of methods are operated by the government while the others have a private, voluntary and contractual origin and are guidance type only. They essentially aim at showing those involved in the building process the potential for improvement. Most building evaluation methods are concerned with a single criterion such as energy use, indoor comfort or air quality to indicate the overall performance of a building (Cooper, 1999; Kohler, 1999). As environmental issues become more urgent, more comprehensive building assessment methods are required to assess building performance across a broader range of environmental considerations. An environmental building assessment method reflects the significance of the concept of sustainability in the context of building design and subsequent construction work on site. The primary role of an environmental building assessment method is to provide a comprehensive assessment of the environmental characteristics of a building (Cole, 1999) using a common and verifiable set of criteria and targets for building owners and designers to achieve higher environmental standards. It also enhances the environmental awareness of building practices and lays down the fundamental direction for the building industry to move towards environmental protection and achieving the goal of sustainability. It provides a way of structuring environmental information, an objective assessment of building performance, and a measure of progress towards sustainability.

Separate indicators, or benchmarks based on a single criterion, have been developed to monitor specific aspects of environmental building performance such as air quality and indoor comfort. However, these benchmarks serve to emphasize the need for a comprehensive assessment tool to provide a thorough evaluation of building performance against a broad spectrum of environmental criteria. The building research establishment environmental assessment method (BREEAM) in 1990 was the first such comprehensive building performance assessment method. BREEAM was the first environmental building assessment method and it remains the most widely used (Larsson, 1998).

In the world there are used a number of assessment systems which evaluate the building according to environmentally friendly building principles and indicate the degree to which these principles are implemented. The resulting certificate is a quality mark that helps consumers and project developers to build a common understanding of environmentally-friendly building supply in the housing market. To some extent, these ratings are the same for all the advice on the well-known package of goods that allow the customer to evaluate the composition and, consequently, quality of the product, and determine whether it meets his needs and financial options.

Many building assessment methods have been created in the world since 1990, the ones most frequently met are:

- *BREEAM* (Building Research Establishment Environmental Assessment Method) – certification system adopted and operating in the United Kingdom;
- *LEED* (Leadership in Energy and Environmental Design) – certification system adopted and operating in the USA and Canada;
- *GREEN STAR* – certification system adopted and operating in Australia;
- *CASBEE* (Comprehensive Assessment System for Building Environmental Efficiency) – certification system adopted and operating in Japan.

These assessment methods vary in scope, structure, format and complexity.

Usage of all of these tools is voluntary, and is more demanding than required by respective national laws and regulations. However, in recent years, many countries have expressed their commitment to devote a certain part of the procurement to the structures which are built following increased sustainable building standard.

4. SUSTAINABLE BUILDING DEVELOPMENT IN LATVIA

Sustainable building ideas become more and more popular in Latvian. It contributed to a number of factors, both economic (the need to conserve resources and energy) and social (consumer dictated market, high standards of quality and comfort), and environmental issues (responsibility for climate change and pollution reduction). Sustainable building has several benefits to sustainable development. Creating high-quality, environmentally friendly and healthy living space, ecological, economic and social sustainability are promoted, it is a way how to live more environmentally friendly and healthy, without sacrificing modern comforts and traditional standards of quality, but at the same time thinking about our children and grandchildren's future and the rights to live in a clean environment.

Some of sustainable building's elements, such as using of natural resources and materials, has been known in the Latvian historical buildings. A modern sustainable building combines centuries of proven expertise and modern technological solutions for optimal balance between tradition and innovative solutions.

The decision of the European Parliament determines that until 2019 all new buildings would have to meet zero-energy requirements, thus these new buildings by themselves must produce as much energy for heating as they consume. In order the passive or low energy building would meet the determined requirements for heating of such buildings ground heat pumps, solar or wind power must be used. Erecting buildings according to any of the concepts still new for Latvian market, but well agreed in the world can:

- improve competence, education level and competitiveness of all professionals and companies involved in the industry;
- not blindly follow low Building Code requirements, but by working following the highest standards, raise also the regulatory bar;
- support local entrepreneurship, research, innovation and in that way heat national economy of the country;
- reduce dependence on expensive imported energy resources
- reduce CO_2 emissions into the atmosphere;
- in the long run improve the living space and housing quality;
- live in harmony with one's conscience.

The impacts of construction materials on the environment started to be dealt more seriously, when the building industry was identified as a prime target group to reduce climate change in Latvia. At the same time, energy saving policies started to be dealt together with issues including materials' selection, taking into account the reduction of finite raw materials use, such as sand, gravel and clay, and indoor environment, as well as the reduction of noise pollution and elimination of asbestos and radon. The issue of saving on fossil fuels turned into a wider societal concern over the vulnerability of the Latvian society regarding its geographical composition due to global warming and the threat of increasing sea levels and non-renewable resources preservation. A phase of sustainable building practices in Latvia started to emerge as the sustainable development discourse came to the fore, introducing the

idea of closed loops for materials, energy saving and efficiency and the promotion of quality as central policy lines. There is also a strong emphasis on policies such as climate change, ozone depletion, acid rain, fertilizers, and waste disposal as it was realized that environmental issues were not only restricted to the energy conservation dimension.

Despite the different climate, culture and economy, there are many similarities among the developed and developing countries in terms of the impact of construction industry on environment (Melchert 2007).Most environmental building assessment methods were developed for local use and do not allow for national or regional variations. To a certain extent, weighting systems can offer opportunities to revise the assessment scale to reflect regional variations and criteria order. However, regional, social and cultural variations are complex and the boundaries are difficult to define. These variations include differences in climatic conditions, income level, building materials and techniques, building stocks and appreciation of historic value (Kohler, 1999).

Many countries have adapted the BREEAM system for their own use giving rise to new systems such as HKBEAM, BEPAC and GreenStar, BASIX, AccuRate in Australia. Adjustments to customize the system include cultural, environmental, social and economic considerations. It is unlikely that a set of pre-designed environmental criteria could be prepared for worldwide use without further adjustments, for instance, using geographically adapted database (Reijnders and van Roekel, 1999).

Facilitating successful cooperation of professionals and legislature, professionals of the construction industry of Latvia have formed a voluntary initiatives group to develop sustainable building construction criteria applicable for Latvian market, to develop and implement building assessment system. The project began in 2007 and is still in progress.

The project aims to reach a conceptual agreement on locally sustainable building principles and to develop sustainable building assessment and certification tool that would provide objective measurement for such structure. It must be objectively measurable, comparable, comprehensive, independent, and financially affordable and has international standing, highlighting this type of buildings from the crowd and accentuating their added value. The instrument should also contribute to the increase of the construction quality in order to especially accentuate or highlight sustainable buildings in the real estate market.

Organization "Green Home" in 2007 established Working Group: professionals of the participating disciplines (builders, architects, developers, environmentalists, representatives of environment protection organizations and other related sectors) developed and agreed on environmentally friendly building principles that are suitable to local conditions (Green Home). Working Group developed sustainable building principles by analyzing examples existing in the world and adapting them to local conditions Within three months of joint discussions and evaluation, the first version of the document, which includes the definition of sustainable construction, its eight basic principles as well as evaluation criteria, was drafted The framework developed covers the construction life cycle from planning, construction, management up to the dismantling or reconstruction of the building site. A key guideline of the basic principles is sustainable development: the assessment whether the building, its construction and management, is environmentally friendly, socially and economically beneficial. The first version of the sustainable building and management principles in Latvia was presented. This document includes instructions what should the buildings be in order to be recognized as sustainable, with this understanding integration of environmental, social and economic issues to facilitate sustainable development. Final version of the document was published in 2008.

The building market is diverse and complex. The commercial relationships between the many specialists involved are intricate and critical in sparking action on building efficiency. The complexity of interaction among all market participants is one of the greatest barriers to sustainable buildings.

The path towards building sustainable industry also in Latvia is illustrated in Fig.1. Fig.1 identified all general stakeholders in the construction industry which include the government, developers, clients, buyers/ end users, contractors, consultants (architects, other designers, engineers, quantity surveyors) and manufacturers/ suppliers. It is important for construction practitioners to understand sustainable construction sufficiently to be able to ensure that their individual actions, and the decisions they make that influence the actions of others, add as little as possible to the total burden on the environment.

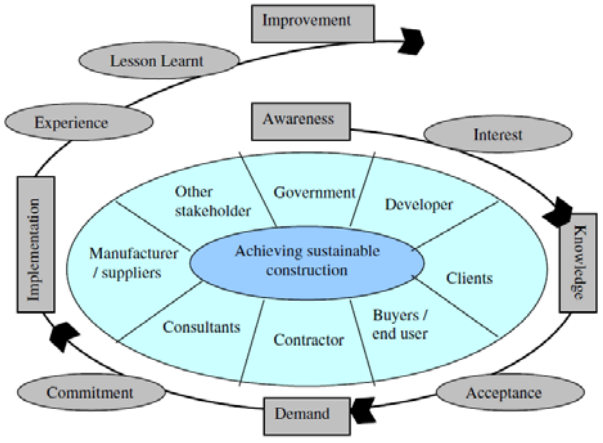

Figure 1: The path for achieving sustainable construction (Parkin,2000)

Based on the interest expressed by the industry (builders, developers, material producers) to implement unified and reasonable methodology for quality assessment of the sustainable buildings in Latvia, in the summer of 2009 the organization "Green Home" has initiated new project "Sustainable building assessment

and certification tool (IBANSI)". The project has got support from the program "Environmental policy integration program in Latvia" that is co-financed by financial instrument of the European Economic Area (EEA) and is supervised by the Ministry of Environment of the Republic of Latvia. The project is supported by initiative group consisting of the largest construction companies: SIA „RE&RE", SIA „Knauf", SIA „Jaunrīgas attīstības uzņēmums", SIA „Ramirent", SIA „Saint-Gobain Celtniecības Produkti"

According to research results and analysis of the data received as well as suggestions provided after consultations with industry experts and project supporters, it was decided that Latvian instrument has to be based on the sustainable construction and assessment system BREEAM that is popular in European construction market as the development of new and unique system is too expensive. The fact that BREEAM is one of the mostly broadly applied methods in assessing the environmental impact related to the buildings has been in favor of such choice. More than 200 000 buildings in the world have BREEAM certificates and more than a million of them have been registered for certification (BREEAM 2009).

This system with good results has already been adapted in the Netherlands, it has been chosen as a basis for the construction assessment standard also in Spain, Russia, France, in twenty countries in total. Construction sites are evaluated by independent evaluators, thus ensuring objectivity of the results. The system is voluntary, it facilitates inclusion of economic, environmental and social aspects into the building, thus providing many benefits for building users, builders and the society and the planet as a whole.

To ensure that the BREEAM system meets climatic and economic conditions of Latvia, as well as is in compliance with current legislation, in 2010 it is planned that the system will be customized by developing BREEAM version suitable for Latvia in expert working groups.

BREEAM can be used to assess the attributes of a wide range of building types. BREEAM evaluates a range of building related components such as: performance in management, energy use, health and well-being, pollution, transport, land use, ecology, materials, and water. Each category is awarded 'credits' that are weighted and added together to generate a single score, which in turn is rated as „pass", „good", „very good", „excellent", „outstanding".

Project Management Group provides consultations and strategic management of the process during development of localization of BREEAM methodology. Senior management representatives from the technical science and research organizations, project developers, architecture, engineering professionals, public authority decision-makers, representatives of financial institutions are invited to participate in this group.

Expert Groups, according to BREEAM categories, operate in nine separate areas. The task of these groups is to review the flexibility of BREEAM methodology.

As the result of this project, by December 2010 it was intended to develop the first draft of the assessment and certification system of sustainable construction and management.

Within the project framework it is planned to develop the methodology of technical assessment, and at the pilot stage perform evaluation and certification of the first construction sites. Resultant Certificate will be quality proof for the sustainably constructed buildings that consumers and project developers will help to develop a common understanding of sustainable building supply in the housing market. Certification is designed as voluntary, system audited by independent third-party that is similar to the currently operating ones in many countries around the world.

The main advantages for the development of green building assessment system in Latvia are existing base and awareness of the general public.

Existing base. Latvia is the EU Member State and it must take into account all the EU requirements related to environmental protection and other environmental issues. Latvia has the general strategy and action plan for sustainable development. Sustainable construction has already been taken as a basic policy in the construction industry. To realize sustainable construction, laws and policies have been made under the direction of sustainable strategy in Latvian construction sector. The Environmental Protection Law can be regarded as the basic foundation of green building in Latvia. Based on this law, many regulations and rules have been made which cover different profiles of green building assessment, such as the Regulations on Environment Protection Management, the Energy Saving Management Regulation for Civilian Building and the Commercial House Performance Assessment institution etc. These regulations and rules have formed a basis to launch a life-cycle green building assessment system in the future. In the Development Guidelines of the Construction Industry of the Republic of Latvia for 2009 to 2013, it has been determined that the aim of the state policy is to create such conditions for the construction of buildings for the national economy needs that are environmentally friendly, healthy, modern buildings thus saving energy and natural resources. [9] Much has been done and progress has been made regarding energy efficiency issues. Increasing energy efficiency of buildings became a national problem in Latvia. The "Energy principles of Latvia for 2006-2016" has been developed, where the reduction of the average specific heat consumption from existing 220-250 kWh/m2 to 195 kWh/m2 by 2016 is determined to be the main objective.

Awareness of the general public. More and more people gradually attach importance to sustainable construction. Compared with some developed countries, the percentage is not very high at present. However, the concept of green building has been widely accepted by the general public, especially in the urban area, which can be demonstrated by the urban housing market. Houses with better green building performance are

usually sold with higher prices. Many people are apt to buy houses which can be good at energy saving and with good indoor environment quality. During the decoration stage of the houses, people no longer pay much attention to the luxury and honorable materials but the healthy ones. What they think about is how to make their home comfortable and healthy rather than to make them in the lap of luxury. Therefore, the awareness of green building by the general public will form the market-driven power for the application of green building assessment.

The main difficulties found as to the application of green building assessment system are lack of professionals, lack of basic data of implementing assessment, as well as lack of interest from real estate developers.

Lack of professionals. To implement green building assessment in the construction sector, there must exist a large number of professionals who are good at both construction and environmental knowledge. However, this requirement has not been met for the moment. Although there are many architects and engineers who are experienced in project design and construction, few of them have education or training background of sustainable construction, let alone green building assessment practice, which is an obstacle to push green building assessment forward in Latvia.

Lack of basic data of using assessment system. The main difficulties of using green building assessment system are related to the general lack of environmental data and standardization. There still does not exist a life cycle assessment (LCA) database to easily access the environmental profiles for materials and products, which is the fundamental requirement for green building assessment.

Lack of interest from real estate developers. Although sustainable construction has been regarded as a good policy, the real estate developers, designers and contractors are only interested in if they can get more profit. Developing a project with high-level green building performance may not directly lead to an immediate payback. The biggest barrier is that investors have the final decision making authority on buildings and, under current circumstances, they are pursuing profit maximization. Sustainable building option conflicts with profit maximization. Except for some of the performance such as energy saving and indoor environment quality which are concerned by the consumers, the developers seldom really devote themselves to promote the life-cycle environmental loading performance of a building, notwithstanding they always boast they have develop a green building project in the advertisement. Without a definite reward, the developers are not really interested in using green building tool to assess and improve their project performance. Therefore, to push forward the application of green building assessment system, other related policies or institutions should be made such as definite tax reduction or exemption to the developers, designers and general contractors.

So far, green construction in Latvia, unfortunately, still is in its infancy stage. But everything has a beginning.

In order to implement the system, it should be incorporated in state-funded procurement orders. Also the support for education of the parties involved in construction and the prospective buyers or tenants is needed. First of all, attention should be given to public buildings where the widest possible range of people can get acquainted with the sustainable construction techniques.

Latvian scale sustainable development is a path to energy independence. Moreover, Latvia is unique with its wilderness nature areas and resources that should be maintained using sustainable construction. Green Building is the way how by using solutions of modern technologies and building materials develop long-term effective structures. It is the way of how to live more natural, not abandoning from today's traditional comfort and quality standards. The more effectively energy is consumed and more wisely spent resources, the lower maintenance expenditure on buildings - it is sound choice for the safe and better tomorrow.

5. CONCLUSION

Architecture and construction has an essential role to national socio-economic growth and increasing prosperity of its people. Individual's living, working and recreational environment that is the result of the designers, builders and engineers work, is a kind of indicator that shows how economically viable, socially just and environmentally friendly the state uses renewable and non-renewable resources that are at its disposal, scientific and technical progress achievements, human intellectual and physical potential.

Sustainable building is complex solutions and practices that increase the efficiency of buildings, reducing energy, water and other natural resource consumption, also by reducing material input per unit and power- intensity of buildings, their construction and management processes and negative effects on human health and the environment. It is achieved by selecting appropriate architectural and structural solutions, the correct positioning of the building, to optimize the building in design, construction, maintenance and demolition using resources and assessing it through whole life cycle – construction, maintenance and demolition stages.

To promote the application of Green building assessment system in Latvia, the government should make compulsory policies and institutions which can directly incorporate life-cycle green building assessment into the basic construction and operation process. A life-cycle green building assessment system should be employed for the assessment of the life-cycle green building performance of a construction project. Using such a system should be a compulsory requirement. At the same time, as a reward, corresponding tax reduction and exemption policy should be made which can be

cooperated with the application of green building assessment system. In addition, in the government ranking system to the design and construction enterprises, achievement in building project with green building performance should be regarded as an assessment indicator.

When establishing green building assessment system in a certain country, it is very important to make it in accordance with the international standard. Therefore, the establishment of building assessment system should be based on an international standard such as BREEAM. That is, the indicators of the assessment system and the approach to use the system should both refer to the international standard. The advantage of referring an international system can not only make the assessment system more reasonable, but also make the result more acceptable. As the climate, natural resources and economic situation vary from region to region customizing should be used according to the local and regional situation in the application of green building assessment system.

Before the application of green building assessment system in Latvia, the fundamental database for green building performance should be established. Although there some international databases exist, it cannot be directly employed in the Latvian context. The database must be developed according to the situation in Latvia. It should be a completed LCA database which includes the detail energy consumption and environment loading data of construction materials and products. This onerous work should be done as soon as possible because it will take a long time.

To push ahead with the application of green building assessment system, there must be enough professionals who are knowledgeable in sustainable construction. Unfortunately, there is still lack of such professionals to carry out green building assessment work at present in Latvia. The only way to get rid of this obstacle is by launching training and education program. This work should also be started immediately, as it is a major premise for the application of green building assessment system. Meantime, the assessment system for the professionals and organizations that will carry out green building assessment work should be gradually set up. The manage system for these assessment professionals and organizations should be mature, otherwise the green building assessment work cannot be implemented in perspective and the assessment result is meaningless.

Green construction does not only mean contribution to environment conservation, it includes also social, environmental and economic point of interaction. Green construction is a quality in a long-term; it means modern solutions and innovation that increase added value of the projects. As the green building principles are comprehensive, currently, significant efforts must be made in raising awareness of the society, state, local governments and entrepreneurs to this issue. People understand sustainable development of the construction as high-quality living environment, that is, healthier living conditions, reduced costs for the long run, less energy consumption, etc.

Investors and developers would gladly invest in sustainable building if it is made clear that construction of sustainable building generates high asset value in the future, and also contributes to profitability.“

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