BUILDING AS LONG-TERM ENVIRONMENTAL DEVELOPMENT AND PRESERVETAION CONDITION

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ABSTRACT

Long-term building ideas developed in other countries known as sustainable building are becoming more popular also in Latvia. That is stimulated with the help of many conditions: economic (necessity for saving resources and energy), social (market - dictated by the consumers, high demands for the quality and accommodations), as well as activation of the environmental issues (taking responsibility for the diminishing of the climate changes and pollution). The paper describes International agreements on climate change reduction. Latvian national policy documents, main energy design and livability criteria of the Model Home 2020 experiments, BREEAM (Building Research Establishment's Environmental Assessment Method), there are analyzed current economic situations in the building evaluation in Latvia. In this paper sustainable building and management basic principles are inspected and technical criteria are analyzed. Also characteristic building economic analysis is given. The paper gives recommendations for the improvement of the situation.

Key words: long-term environmental development, sustainable building, BREEAM

INTRODUCTION

In the times of climate changes and globalization researches involving security of long-term environment, saving of the resources, as well as the preservation of the identity and singularity of the place are activating. The concept long-term involves balancing of the economic and social issues of the environment, maintaining balanced development.

The aim of long-term development is to secure continuous improvements of the quality of life and welfare for the existing and future generations. It is an essential goal of the European Union. However, rapid global changes, from the melting of glaciers to the growing demand for the energy and resources, are making it difficult to reach the goal mentioned.

Also in the field of building, the task is to create a continuous cycle: to improve the general ecological characteristic quantity of building products in the whole turnover cycle, to popularize and stimulate the demand for building products and technologies and to help consumers make the best choice with the help of more coordinated and more simple labelling.

Long-term building ideas developed in other countries known as sustainable building are becoming more popular also in Latvia. That is stimulated with the help of many conditions: economic (necessity for saving resources and energy), social (market - dictated by the consumers, high demands for the quality and accommodations), as well as activation of the environmental issues (taking responsibility for the diminishing of the climate changes and pollution).

Table 1

Benefits of long-term building

Environmental benefits	Economic benefits	Social benefits
preservation of the ecosystem and biodiversity;	diminished building exploitation expenses;	improved air quality;
raised air and water quality;	raised value added;	raised comfort level and healthy living conditions;
less solid fuel;	support to the local manufacturers and economic;	diminished spare load to the infrastructure;
saving and non-exhausting natural resources.	raised working productivity and employee satisfaction; improved economic (economy in the whole usage time) showings of the building life cycle.	higher quality of life.

There are many advantages of the long-term building securing long-term development. (J. Brizga: Creating qualitative, environment-

friendly, and health-friendly living space, ecologic, economic, and social sustainability is facilitated. It is a way of living environment and health friendlier, without giving up nowadays so common accommodations and quality standards, though at the same time thinking of the future of our children and grandchildren and rights living in clean, resources non-exhaust environment.

Long-term building involves complex solutions and practice, that increases the efficiency of houses, diminishing consumption of the energy, water and other natural resources, diminishing houses, their building and management processes material input per unit, power-intensity and negative impact to the people's health and environment. It can be achieved choosing appropriate architectonic and constructive solutions, proper building location to optimize in the planning of the buildings, building, exploitation and demolition, consumed and exploited resources, evaluating their complexly in the whole life (building, management, and demolition) cycle. (www.zalasmajas.lv)

INTERNATIONAL AGREEMENTS ON CLIMATE CHANGE REDUCTION

At the United Nations Conference in Rio de Janeiro, 1992, sustainable development was announced as the way of social-economic questions balanced solution and environment protection.

The UN climate change conference in Mexico, Cancun, was on 29 Nov.-10 Dec. 2010. The Member States have agreed to fight global warming and developing countries to provide funds for a compromise in the fight against the climate change. A new document was adapted to combat global warming, which also includes the Green Climate Fund for the developing countries, where a significant proportion of the funding will go to fight the climate change.

Latvia has undertaken to fulfill its international commitment to global climate change by signing the UN Framework Convention on Climate Change (the Convention) in 1992 in Rio de Janeiro and ratification of the Saeima in 1995.

The Convention aims are to achieve greenhouse gas (GHG) concentration in the stabilization of the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

On January 23, 2008, the European Commission published the Climate Energy Package and the related documents. The package includes the following laws and regulations:

1. Emissions Trading Scheme (ETS) Directive Statement;
2. The decision to reduce emissions in sectors not covered by the ETS;
3. Renewables project;
4. The draft directive carbon capture and storage and impact assessment.

The future of construction is facing serious challenges – resource supply, energy efficiency and unhealthy buildings to name but three. The real challenge facing us is essentially a dual challenge – energy and livability.

The EU has adopted a comprehensive package for European energy policy up to 2020. It entails that EU member states are to reduce their total energy consumption and CO2 emissions by 20%. Moreover, all EU member states must document that 20% of their total energy consumption comes from renewable energy sources.

The Latvian national policy documents are:

1. Latvian National Development Plan 2007-2013. Sustainable development is defined as the social, environmental and economic factors of employment;
2. Construction industry guidelines for 2011-2015:"The main task of the Guidelines is to establish policies for sustainable and competitive construction industry development";
3. Construction sector policy framework; one of the six principles of environmentally sound, competitive and sustainable construction principles;
4. Construction Law Project. One of the four fundamental principles of sustainable construction principles;
5. Recommendations for the promotion of environmentally friendly construction, approved by the Cabinet, 22.12.2008;
6. Environmentally-friendly procurement manual;
7. European Parliament and Council Directive 2008/98/EC of 19.11.2008, on waste and repealing certain Directives;
8. European Parliament and Council Directive 2010/31/EK 19/05/2010, on buildings;
9. Energy management system EFT EN ISO 16001, from 2011;
10. Founded a new association - the Latvian Council of sustainable construction. "

MODEL HOME 2020

In order to find solutions to the challenges of climate change and livability, we need to examine a future model that addresses them as a holistic solution.

The ultimate objective of future construction and subsequent use of a building is taken into account in the design phase; it should employ modern technology and visionary design to create an efficient building envelope without compromising the highest standards of comfort and health; and it should have the lowest possible impact on the climate by using renewable energy sources and adopting the concept of climate payback.

In the EU today, we spend 90 % of our time indoors, in buildings that consume over 40 % of the total energy consumption. Up to 30% of the building stock does not contribute to nor provide a

healthy indoor climate. Looking into a future perspective of how we construct and renovate buildings, it is necessary to consider climate changes, resource supply and human health.

Energy challenge. Buildings consume approximately 40% of all the energy we use (European figures).

Considering the total energy consumption throughout the whole life cycle of a building, the energy performance and energy supply is an important issue in the concern about climate changes, security of supply and reduced global energy consumption.

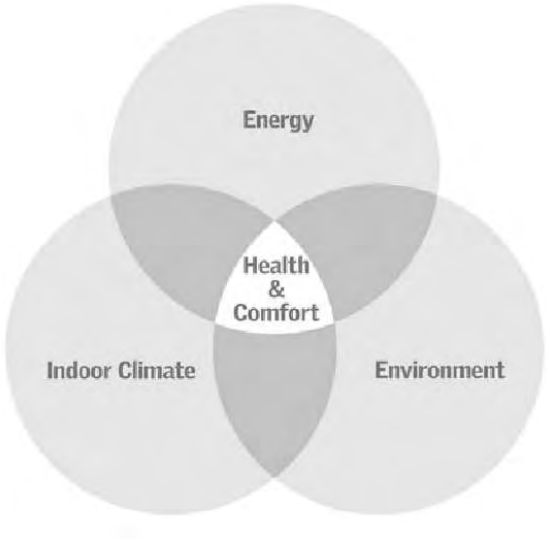

Figure 1 Energy, environment and indoor climate challenge.

Environment challenge. Although the challenges we face are global, the local environment, which always has unique features, must be considered carefully. An open-minded approach to flexible solutions that take into account local cultural and infrastructural differences creates a cleaner environment with less pollution and waste, each time reflected in the best solution for the specific context.

Indoor climate challenge. People spend 90 % of their time indoors, but less than 30% of the building stock contributes to or provides a healthy indoor climate. Humans need comfortable conditions including thermal conditions, fresh air and daylight when they are indoors. These factors have a positive effect on our health and well-being as well as our ability to perform.

The real challenge facing us is essentially a dual challenge – the energy challenge and the livability challenge. Seven main criteria have been identified as the most important for the energy design and livability criteria of the project Model Home 2020 experiments by specialists of WELUX Group. The main energy design and livability criteria of the Model Home 2020 experiments are:

1. Energy consumption targets.
2. Low-energy standards.
3. Optimized design.
4. Highest energy marking.
5. Intelligent energy performance control.
6. Documentation of embodied energy.

It means: maximized daylight availability, highest daylight levels, strategic window positions, healthy indoor climate, automatic control of natural ventilation, stack effect/chimney effect, sound materials.

BREEAM (Building Research Establishment's Environmental Assessment Method)

BREEAM is the world's leading and most widely used environmental assessment method for buildings. At the time of writing, BREEAM has certified over 200,000 buildings since it was first launched in 1990.

- Developed in the British Research Establishment (BRE), UK;
- The method is an adaptation process in Latvia, Russia, Sweden, Norway, Spain, France, the Netherlands, Turkey, United Arab Emirates;
- Buildings with a certificate of higher market value;
- BREEAM: more than 70 objectively measurable criteria for evaluation of sustainable building nine categories of 'energy', 'material', 'process of construction / building management, "" health / well-being', 'transport', 'water', 'waste ', 'pollution "

Aims of BREEAM**:**

- To mitigate the life cycle impacts of buildings on the environment
- To enable buildings to be recognised according to their environmental benefits
- To provide a credible, environmental label for buildings
- To stimulate demand for sustainable buildings

Objectives of BREEAM:

1. To provide market recognition of buildings with a low environmental impact
2. To ensure best environmental practice it is incorporated in building planning, design, construction and operation.
3. To define a robust, cost-effective performance standard surpassing that required by regulations.
4. To challenge the market to provide innovative, cost effective solutions that minimise the environmental impact of buildings.
5. To raise the awareness amongst owners, occupants, designers and operators of the benefits of buildings with a reduced life cycle impact on the environment.
6. To allow organisations to demonstrate progress towards corporate environmental objectives.

BREEAM has been developed to meet the following underlying principles:

1. Ensure **environmental quality** through an accessible, holistic and balanced measure of environmental impacts.
2. Use **quantified measures** for determining environmental quality.
3. Adopt a **flexible approach**, avoiding prescriptive specification and design solutions.
4. Use **best available science** and **best practice** as the basis for quantifying and calibrating a cost effective performance standard for defining environmental quality.
5. Reflect the **social and economic benefits** of meeting the environmental objectives covered.
6. Provide a **common framework** of assessment that is tailored to meet the 'local' context including regulation, climate and sector.
7. **Integrate construction professionals** in the development and operational processes to ensure wide understanding and accessibility.
8. Adopt **third party certification** to ensure independence, credibility and consistency of the label.
9. Adopt the **existing industry** tools, practices and other standards wherever possible to support developments in policy and technology, build on the existing skills and understanding and minimise costs.
10. **Stakeholder consultation** to inform ongoing development in accordance with the underlying principles and the pace of change in the performance standards (accounting for policy, regulation and market capability).

BREEAM (*British Environmental Assessment Method*):

It sets the standards for the best practice in sustainable development and demonstrates a level of achievement.

It has become the vocabulary used to describe the environmental performance of a building;

BREEAM sets the standard for the best practice in sustainable building design, construction and operation and has become one of the most comprehensive and widely recognized measures of a building environmental performance.

A BREEAM assessment uses recognized measures of performance, which are set against established benchmarks, to evaluate the specification, design, construction and use of a building. The measures used represent a broad range of categories and criteria from energy to ecology. They include aspects related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.

A Certificated BREEAM assessment is delivered by a licensed organization, using assessors trained under a UKAS accredited competent person scheme, at various stages in a building life cycle. This provides clients, developers, designers and others with:

market recognition for low environmental impact buildings;

confidence that is tried and tested environmental practice incorporated in the building;

inspiration to find innovative solutions that minimize the environmental impact;

a benchmark that is higher than regulation;

a system to help reduce running costs, improve working and living environments;

a standard that demonstrates progress towards corporate and organizational environmental objectives.

What does BREEAM do?

- BREEAM addresses wide-ranging environmental and sustainability issues and enables developers, designers and building managers to demonstrate the environmental credentials of their buildings to clients, planners and other initial parties, BREEAM:
- uses a straightforward scoring system that is transparent, flexible, easy to understand and supported by evidence-based science and research;
- has a positive influence on the design, construction and management of buildings;
- defines and maintains a robust technical standard with rigorous quality assurance and certification.

Who uses BREEAM?

Clients, planners development agencies, funders and developers use BREEAM to specify the sustainability performance of their buildings in a way that is quick, comprehensive, highly visible in the marketplace and provides a level playing field.

Property agents use it to promote the environmental credentials and benefits of a building to potential purchasers and tenants.

Design teams use it as a method to improve the performance of their buildings and their own experience and knowledge of environmental aspects of sustainability.

Managers use it to reduce running costs, measure and improve the performance of buildings, empower staff, develop action plans, monitor and report performance at both the single building and portfolio level.

BREEAM NEW CONSTRUCTION

BREEAM New Construction is a performance based assessment method and certification scheme for new buildings. The primary aim of BREEAM New Construction is to mitigate the life cycle impacts of new buildings on the environment in a robust and cost effective manner. This is achieved

through integration and use of the scheme by clients and their project teams at key stages in the design and procurement process. This enables the client, through the BREEAM Assessor and the BRE Global certification process, to measure, evaluate and reflect the performance of their building against best practice in an independent and robust manner. This performance is quantified by a number of individual measures and associated criteria stretching across a range of environmental issues see Table 3, which is ultimately expressed as a single certified BREEAM rating, i.e., the label (section 3 describes how a BREEAM rating is calculated). When to engage with the BREEAM NC scheme, timing the engagement with and use of BREEAM via the BREEAM Assessor is essential for ensuring seamless integration of the methodology in the procurement process. Without this, the ability to cost effectively optimise the building environmental performance and achieve the desired rating will be compromised.
Appointing a BREEAM Assessor or Accredited Professional early in the project will help in achieving the target rating without undue impacts on the flexibility of design decisions, budgets and potential solutions.

Table 3
BREEAM 2011 New Construction environmental sections and assessment issues

Energy	**Water**
Reduction of CO_2 emissions	Water consumption
Energy monitoring	Water monitoring
Energy efficient external lighting	Water leak detection and prevention
Low or zero carbon technologies	Water efficient equipment (process)
Energy efficient cold storage	**Waste**
Energy efficient transportation systems	Construction waste management
Energy efficient laboratory systems	Recycled aggregate
Energy efficient equipment (process)	Operational waste
Drying space	Speculative floor and ceiling finishes
Transport	**Materials**
Public transport accessibility	Life cycle impacts
Proximity to amenities	Hard landscaping and boundary protection
Cyclist amenities	Responsible sourcing of materials
Maximum car parking capacity	Insulation
Travel plan	Designing for robustness
Land use and ecology	**Pollution**
Site selection	Impact of refrigerants
Ecological value of site / protection of ecological features	NO_x emissions from heating/cooling source
Mitigating ecological impact	Surface water run-off
Enhancing site ecology	Reduction of night time light pollution
Long term impact on biodiversity	Noise attenuation
Health and wellbeing	**Management**
Visual comfort	Sustainable procurement
Indoor air quality	Responsible construction practices
Thermal comfort	Construction site impacts
Water quality	Stakeholder participation
Acoustic performance	Service life planning and costing
Safety and security	**Innovation**
	New technology, process and practices

BREEAM-LV

BREEAM-LV is an official at the Bree "family" owned, localized version of the assessment of buildings in the Latvian situation. It means:
1.Economic benefits (higher value and market demand, lower operating costs, support local producers),
2.Social benefits (healthier and more comfortable indoor climate, balanced integration of the surrounding infrastructure,
3.Environmental benefits (less CO2 emissions and other pollution, conserves energy, water and other resources, respect for ecology and biodiversity).

PROBLEMS OF BUILDING SECTOR OF LATVIA

Compared to 2009, the construction volume at constant prices in 2010 has reduced by 23.6%. Of which construction of buildings has decreased by 24.9% and the volume of civil engineering structures constructed – by 22.3%.
Compared to the 3rd quarter of 2010, the construction volume in the 4th quarter of 2010 decreased by 5.5%, according to seasonally adjusted data at constant prices. Of which the construction of buildings diminished by 6.6% and the volume of civil engineering structures constructed have grown by 1.5%.
In 2010 the construction volume (at current prices) comprised LVL 757.5 million, of which in the 4th quarter – LVL 228.9 million, according to the data of the Central Statistical Bureau.

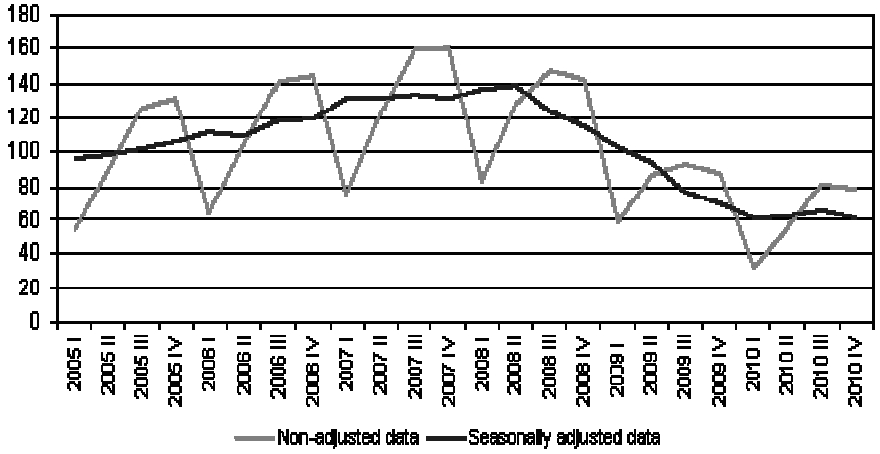

Figure 3. Construction volume index (2005 = 100).

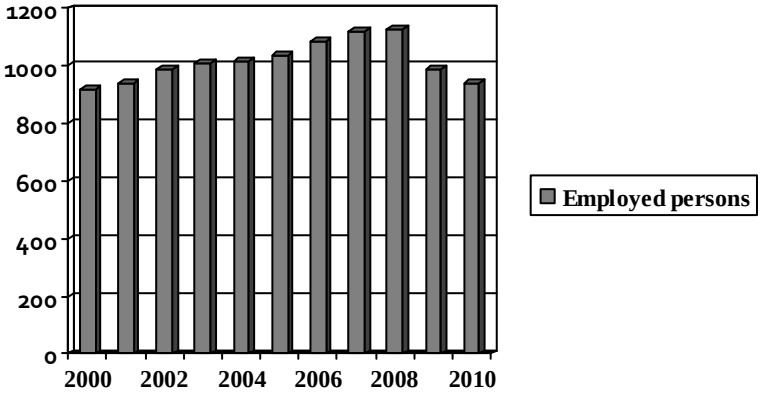

Figure 4 Employed persons in Latvia

Table 4

Construction volume Thsd lats (at current prices)

Year	1st quarter	2nd quarter	3rd quarter	4th quarter	Total
2008	300141	460419	532716	475199	1768475
2009	203514	277839	288112	249457	1018922
2010	107145	173991	247502	228904	757442

Compared to the 4th quarter of 2009, the construction volume in the 4th quarter of 2010 has decreased by 9.6%, according to working day adjusted data at constant prices.

Of which construction of buildings reduced by 6.1% and the volume of civil engineering structures constructed – by 11.9%

If compared to the corresponding period a year before, the most notable reduction of construction and repairs was observed in construction of office buildings and in construction of bridges – by 63.4% and 47.6%, respectively.

Table 5

Completed residential buildings by quarter, thsd m²

	1st quarter	2nd quarter	3rd quarter	4th quarter	Year
Total					
2008	258.9	235.0	336.0	323.3	1153.2
2009	200.0	228.6	118.0	125.4	672.0
2010	102.1	121.9	83.6	74.2	381.8
..investors - private persons					
2008	112.2	90.6	109.5	166.7	479.0
2009	123.0	118.0	95.1	90.9	427.0
2010	89.5	91.3	75.5	64.9	321.2

But growth of the construction volume, in turn, was recorded in construction of wholesale and retail trade buildings and in construction of industrial buildings and warehouses – by 123.6% and 56.4%, respectively.

In 2010 construction management authorities granted 1725 building permits for construction, capital repairs, reconstruction and restoration of single dwelling buildings with total floor space 378.6 thousand m2 (in 2009 – 2110 and 427.7 thousand m2, respectively). 295 building permits were granted for construction of production buildings and warehouses with total floor space 536.5 thousand m2 (in 2009 - 198 permits and 299.0 thousand m2, respectively).

In the 4th quarter of 2010 326 building permits were granted for construction of single dwelling buildings with total floor space 75.9 thousand m2 (in the 4th quarter of 2009 – 405 and 83.1 thousand m2, respectively). 105 building permits were granted for construction of production buildings and warehouses with total floor space 153.1 thousand m2 (in the 4ht quarter of 2009 - 56 permits and 77.0 thousand m2, respectively).

In 2010 1095 building permits were granted for construction of new single dwelling buildings with total floor space 244.2 thousand m2 (in the 4th quarter of 2010 – 197 and 47.7 thousand m2, respectively) and 179 permits were issued for construction of new industrial buildings and warehouses with total floor space 332.5 thousand m2 (in the 4th quarter of 2010 – 69 and 100.7 thousand m2, respectively).

RESULTS AND DISCUSSION

Results of the housing demand qualitative changes are:

1. In the short-term period – a rise of prices for houses in the sector with new standards, after them a rise of prices in all housing sectors. Stopping replenishment and construct of small-sized and social housings.
2. In the long-time period – surplus of housing, including houses not corresponding to the market demand. Falling of the prices in the sector with new standards and, further, in all sector of housing.

CONCLUSIONS

Suggestions for proximate period in the building sector to reduce problems which have caused competition in Latvia:

1. Reducing bureaucracy caused barriers in the building sector.
2. To arrange the legislation basis, especially in relation to the building standards.
3 Further simplifying of the EU funds and procurement procedures for the state or local government that paid for constructive advices during the project;
4. Continue the BEEAM-LV adaptation and implementation process in Latvia;
5. Provide with the strong level of the building competition process and the control results as well as the change of the fundamental principles of competition, so it does not leave the construction cost as the only evaluation criterion.
6. Carrying out public procurement in accordance with the Public Procurement Law or public service provider procurement law, competition regulations to incorporate sustainable building assessment criteria;
7. To accomplish a very skilled expertise in the documentation preparation stage, provide clients with high quality regulation of competition;
8. To develop very precise technical specifications and contract documentation: included into project as construction materials and construction specifications as detailed work organization and cost calculations (estimate). Without specifying the names and parameters of used materials and mechanisms in the work description; contractor's offer generates distrust, as well as gives a serious effect on project evaluation;
9. Choose the most economically advantageous tender selection criteria;
10. Raise the level of competence of the tender evaluation commission in the construction industry, as well as in the related laws, the Cabinet of Ministers and other standards.

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