

## THE ANALYSIS OF THE GREEN BUILDING SUPPORTING ORGANISATIONS IN THE SCANDINAVIAN COUNTRIES AND BALTIC STATES

Ankit MISHRA<sup>1</sup>, Linda KAUŠKALE<sup>2</sup>

<sup>1,2</sup> Riga Technical University, Latvia

Corresponding author's e-mail: [ankit.civil.official@gmail.com](mailto:ankit.civil.official@gmail.com)

---

**Abstract.** Due to increase in growth of real estate development, green certification systems are essential to ensure the well-being of society and environment. Green Building Councils are the main drivers that influence many factors related to development of green buildings, which includes certification, education, conference and other aspects. The aim of the article is to analyse the tendencies of the development of green buildings in the Scandinavian and Baltic countries by analysing the Green Building Councils of the Baltic and Scandinavian Countries, and the number of certified green buildings in both regions. The literature review, comparative analysis, document analysis, and logical access methods have been used in the research. The countries are different from each other and their current and future priorities differ from each other as well. In the research process, it is important to lay some light on the several funds acquired by the regional Green Building Councils and their usage. The research results show that all the countries are working towards the development of green buildings but some countries perform better in the number of certified green buildings. The research results, including the number of green certified buildings, future plans of Green Building Councils, recommendations for future market analysis of green buildings, have already been approbated at the 59th International Scientific Conference of Riga Technical University “SCEE 2018” (Scientific Conference on Economics and Entrepreneurship) in Riga, Latvia.

**Keywords:** *Assessment systems, Baltic States, European Union, Green Building Councils (GBCs), Scandinavia, World Green Building Council (WGBC).*

---

### INTRODUCTION

The benefits of green building in a sustainably balanced way have been proven and discussed in many scholarly articles and research papers. The aim of the article is to analyse the tendencies of the development of green buildings in the Scandinavian and Baltic countries by analysing the Green Building Councils of the Baltic and Scandinavian Countries, and the number of certified green buildings in both regions. The literature review, comparative analysis, document analysis, and logical access methods have been used in the research. The most of the data was gathered in the period May-June 2018. Few studies showed that people living in green certified buildings were more productive (26.4 %) and well-being was compared to the people living in non-certified high-performance buildings (MacNaughton, Satish, Flanigan et. al., 2017). Green buildings not only have

environmental and social benefits, but they are also cost effective. There is little or no evidence regarding the high investment in green buildings compared to normal buildings. The study found out that the cost of green buildings exceeds that of ordinary buildings by more than 0.4–21.0 % (Dwaikat, Ali, 2016). Therefore, it is important to discuss the benefits of certified green buildings from the perspective of leading stakeholders (World Green Building Council, Regional Green Building Councils). The positive impacts of green buildings are as follows (WGBC, Benefits of Green Building, 2016–2018).

- *Environmental*: Green buildings can reduce the environmental stress on the surrounding environment by consuming less water, natural resources and energy. They can also generate their own electricity and increase biodiversity.
- *Economic*: There are many economic benefits of green buildings such as reduction in utility bills, lower construction cost, higher property value etc.
- *Social*: There are great health benefits for all types of green buildings (commercial, residential, industrial, and educational) in the long run. The result of having green buildings on the people are that the lives are more productive, healthier and happier.

The *aim* of the present article is to find out the tendencies of development of green buildings in the Scandinavian and Baltic countries by analysing the number of certified green buildings in both regions. The *tasks* of the article are following:

- to analyse the regional Green Building Councils (GBCs) of both Scandinavian and Baltic countries;
- to perform analysis on various green building certification systems in the regions;
- to find out the plans and various tasks of GBCs to improve government policies and activities related to promotion of the development of green buildings;
- to make conclusions and to develop recommendations regarding the market analysis of green buildings.

The literature analysis, document analysis, comparative analysis and logical access methods have been used in the research. The analysis is performed on the basis of new construction projects, and EBOM (Engineering Bill of Materials) or separate in-use analysis are not included in an analytical overview.

Sustainable real estate development is “a balanced development of real estate in which economic, social, environmental, political, technological and legal aspects of real estate market development, long-term national and real estate market development policies, conservation and preservation of the environment, housing affordability issues and development are included” (Kauškale, Geipele, 2017), which contributes to a better quality of life of society during the entire real estate market cycle period. Therefore, the non-government organisations, such as WGBC (World Green Building Council, 2017), are moving the global property market towards sustainability by establishing regional Green Building Councils throughout the world. The strategies made by WGBC for cities and countries worldwide are contributing to their national and international commitments to reduce carbon emissions and redress other environmental impacts” (Hydes, Gregory Richardson

& Petinelli, 2018). The green building certification systems help measure the quality of green projects developed to have a proper understanding of a green factor in the buildings.

## **1. AN OVERVIEW OF GREEN BUILDING DEVELOPMENT**

### **1.1. World Green Building Council**

World Green Building Council was formed in 1993 as a non-profit organisation to focus on the development of green buildings around the world and to unite the important players of construction sectors with similar interest. Now the organisation has reached 72 countries and collaborating with 49 000 members and companies (World Green Building Council, Annual Report 2016–2017). The sub-division of this non-profit organisation is divided into countries, and different countries have various different aims related to green building development in their country. Similarly, Scandinavian and Baltic countries have their own Green Building Councils and the assessment system used for certifying the buildings is both similar and different.

The positive impact of the organisation can be seen in its latest Annual Report of 2016–2017. The statistics provided in the latest report:

- regional Green Building Councils have certified 1.24 billion square meters of new green building space;
- by the contribution of Green Building Councils, 31 countries have made changes in their existing building policy at either city, regional or national levels.

As we can see from the contribution of WGBC above, the importance of WGBC cannot be overseen as it is one of the most important drivers for the development of green buildings. Green Building Councils do not directly certify projects, and every GBC is unique in its own approach to influence the development of green buildings.

### **1.2. Regional Green Building Councils**

The Green Building Councils of the regions, which are or aim to be the member of World Green Building Council, are one of the major contributors to the development of green buildings in their region. These regional GBCs are also non-profit organizations, which work independently for their country. According to their level of establishment in their regions, the members of WGBC are divided into three categories: established, emerging and prospective ones. We focus on the Scandinavian and Baltic countries.

**SCANDINAVIA:** On the basis of environmental, social and governance (ESG) analysis and assessing 17 different indicators by RobecoSAM in November 2017, the countries of Scandinavia (Denmark, Norway and Sweden) ranked among top five. Sweden ranked number one, Norway ranked third and Denmark – fourth. Therefore, the practice towards overall sustainable development is at the top level in these countries. The 2014 EPI (Environmental Performance Index) by YCELP (The Yale Centre for Environmental Law & Policy) also showed that Sweden

ranked 9th, Norway ranked 10th and Denmark – 13th. The Global Sustainability Competitiveness Index (GSCI) of 2017 by SolAbility showed the ranking of Scandinavian states: Sweden was ranked first, Norway – second and Denmark – fifth. GSCI is calculated by the help of 111 indicators from reliable sources that are divided into 5 sub-categories: governance, intellectual capital, natural capital, social capital and resource efficiency. This ranking shows the determination of the Scandinavian countries towards green development.

The Green Building Councils of the Scandinavian countries work independently like other GBCs. They work on the green building programs, changing government policies and bringing accountability along with transparency. The GBCs of Scandinavia are as follows:

*Swedish Green Building Council (SGBC):* The SGBC was collaboratively established with the World Green Building Council in 2011 as an established member. SGBC is one of the most successful regional GBCs, which grew from 13 members in 2009 to 330 members in 2017. The green certification system used by SGBC are LEED, BREEAM, Miljöbyggnad and GreenBuilding. The further description of these assessment systems is provided further in the article.

*Green Building Council Denmark (DK-GBC):* Denmark Green Building Council was established in 2010 and this Green Building Council only uses DGNB (German Assessment of Green Buildings) assessment system to certify its projects. Denmark has yet to join the alliance of Green Building Councils with the WGBC. With currently 270 members, which include organisations, companies and individuals, DK-GBC has already certified close to 50 projects or buildings.

*Norway Green Building Council (NGBC):* Norway Green Building Council was founded in 2010, and since July 2018 NGBC has been collaborating with the WGBC as an established member. NGBC uses BREEAM International to assess its projects and has adapted to BREEAM rating system as BREEAM-NOR. There are approximately 114 projects, which are certified by BREEAM-NOR.

The brief description above shows the founding years and green certification system used by the GBCs. For further development of the research paper, the number of members mentioned can be analysed and the market of green buildings can be investigated. The evaluated results of the Scandinavian countries are shown at the end of this section.

**BALTIC STATES:** The EPI 2014 ranking of the Baltic countries was 20, 40 and 49 for Estonia, Latvia and Lithuania, respectively. The Global Sustainability Competitive Index (GSCI) of 2017 ranked the Baltic countries as follows: Latvia – 9th, Estonia – 10th and Lithuania – 23rd. Even though the Baltic countries are lagging behind the Scandinavian countries in terms of sustainable and green practices, their practices are still one of the best in the world. The Green Building Councils of the Baltic countries are as follows:

*Latvian Sustainable Building Council (LSBC):* This non-government organization was established in 2010, and in 2012 the LSBC joined the World Green Building Council as a prospective member. The LSBC also organizes the contest “The Most Sustainable Project, Buildings and Idea” to certify projects and buildings on a yearly basis. The LSBC has collaborated with BREEAM, and the evaluating criteria of projects are performed on the basis of energy, material,

environment, transport etc., but there are more certification systems used by the LSBC. There are twenty certified projects and buildings by the LSBC in Latvia, and the assessment systems promoted and used by the Latvian Sustainable Building Council are as follows:

- BREEAM-LV;
- LEED;
- DGNB.

*Estonian Green Building Council (EGBC):* EGBC is the part of the World Green Building Council, which uses BREEAM and LEED certification systems to assess its projects. There are 32 sustainability certified buildings and projects by the EGBC. The EGBC along with KEN Cluster also organizes “Most Sustainable” awards competition to boost the balanced approach towards sustainable development of real estate. There are a total of 45 members in the Estonian Green Building Council.

*Lithuanian Green Building Council (LGBC):* LGBC was formed in 2013. It is not a member of the World Green Building Council. The LGBC also organizes the competition “Green Building Lithuania”. There are a total of 44 green certified projects in Lithuania. The LGBC has 30 members, and the organization uses three green building certification system which are as follows:

- LEED;
- BREEAM;
- DGNB;
- LPTVS (Lietuvos Pastatu Tvarumo Vertinimo Sistema).

There is a lack of information on the GBCs of Denmark, Lithuania and Estonia on the type of membership with the WGBC. Lithuanian and Danish GBCs are yet to become a member of WGBC even though they are actively working on the development of green buildings in their regions. The regional GBCs have prioritized the use of certification systems according to their regional requirements and Lithuania and Sweden have developed their own certification system, which solely focuses on their market. The description of different assessment systems is shown below.

## 2. ASSESSMENT SYSTEMS AND THEIR CHARACTERISTICS

Different assessment systems used in the world apply slightly different ways and methods to certify their buildings and projects. However, the indicators used by these assessment systems revolve around the sustainability factors, and different assessment systems have different percentage of priority towards their indicators. There is a great need for updating standards of assessment methods according to the regional requirement. It should be noted that there is also a gap in scientific studies regarding a comparative analysis of assessment systems, as well as there is little scientific evidence found on new adaptation and requirements (Li, Chen et.al, 2017). Therefore, the adaptation and nationally developed assessment systems are discussed later in this article.

### ***BREEAM (British Research Establishment Environment Assessment Method) Systems***

BREEAM is the world's first sustainability assessment method for buildings established in 1990, and it is also widely used all over the world. There are a total of 564,677 certificates provided, and there are 2,272,959 registered buildings of 77 countries by BREEAM (British Research Establishment Environment Assessment Method, n.d.). BREEAM uses ten issues to certify or assess the projects, they are (British Research Establishment Environment Assessment Method, n.d.):

1. Energy;
2. Health and well-being;
3. Innovation;
4. Land use;
5. Materials;
6. Management;
7. Pollution;
8. Transport;
9. Waste;
10. Water.

The projects are also sub-divided into different categories, which are as follows: communities, infrastructure, new construction, in-use, refurbishment and fit-out. According to their use, buildings are also divided into sub-categories: office, retail, industrial, data centres, education, health care, residential, mixed-use, and other buildings (British Research Establishment Environment Assessment Method, n.d.). The projects are also certified according to their sustainability score. There are six types of rating (British Research Establishment Environment Assessment Method, 2011):

1. Outstanding  $\geq 85$  %;
2. Excellent  $\geq 70$  %;
3. Very good  $\geq 55$  %;
4. Good  $\geq 45$  %;
5. Pass  $\geq 30$  %;
6. Unclassified  $< 30$  %.

#### **LEED (Leadership in Energy and Environment Design) Assessment Systems**

LEED assessment system was developed by the United States Green Building Council in 1993. LEED certifies 2.2 million square feet area every day and the assessment system is flexible to be used in all project types. Criteria are given by reviewing various characteristics of the project: sustainable sites, water efficiency, energy and atmosphere, material and resources, indoor environment quality, innovation and regional priority credits (Leadership in Energy and Environment Design, n. d.). The certification points are assessed according to the above-mentioned LEED criteria (Leadership in Energy and Environment Design, n. d.):

1. LEED Certified: 40–49 points;
2. LEED Silver: 50–59 points;
3. LEED Gold: 60–79 points;
4. LEED Platinum: 80+ points.

Buildings are evaluated according to these points, but no scientific evidence was found to understand the standards of grading system.

**DGNB (*Deutsche Gesellschaft für Nachhaltiges Bauen*) Assessment System**

DGNB is the German assessment system developed by the German Green Building Council in 2007. However, this Green Building certification system was launched in Germany, many other countries, e.g., Denmark, Austria, Switzerland and few more have adapted this system and are using it.

This system focuses on various different factors to rate and certify its projects, which are (Deutsche Gesellschaft für Nachhaltiges Bauen, 2018):

1. Environmental;
2. Economic;
3. Sociocultural;
4. Functional;
5. Technological;
6. Process;
7. Site of the building.

The different types of projects are rated according to their score: Platinum (80–65 %), Gold (65–50 %), Silver (50–35 %) and Bronze (35 % and below) (Deutsche Gesellschaft für Nachhaltiges Bauen, 2018).

As shown above, DGNB and LEED certify their projects in four categories, while BREEAM certifies in six categories. This could also be due to the fact that BREEAM was established earlier than LEED and DGNB, which advanced their category list.

### 3. DOMESTICALLY DEVELOPED ASSESSMENT SYSTEMS OF THE BALTIC AND SCANDINAVIAN COUNTRIES

These assessment systems were developed by their regional Green Building Councils for their requirements with a focus on their regional markets. Only Denmark has adapted to BREEAM standards with a focus on its market.

**Sweden (*Miljöbyggnad*):** This is the system made for Sweden and it has already certified over 1000 buildings. This assessment system is adapted according to the Swedish market and the Swedish government construction rules and regulations. Miljöbyggnad 3.0 has been developed according to the latest standards and it is mandatory for all new projects to have registration of Miljöbyggnad 3.0. The previous version was Miljöbyggnad 2.0. The rating system used for this certification is Rated, Bronze, Silver and Gold.

**Lithuania (*LPTVS*):** LPTVS (Lietuvos Pastatu Tvarumo Vertinimo Sistema) is an assessment system developed by the Lithuanian Green Building Council for the Lithuanian market. However, the certification system was prepared according to the methods used internationally. This assessment system focuses on the eight categories by precise percentage:

- Health: 17.9 %;
- Energy: 26.8 %;
- Transport: 10.7 %;
- Land Use and Ecology: 8.9 %;

- Materials: 8.9 %;
- Waste Management and Pollution: 12.5 %;
- Project Management: 5.4 %;
- Water Management: 8.9 %.

Only Lithuania among the Baltic countries has adopted an assessment system according to its market and preferences. Swedish Miljöbyggnad is the most successful certification system among all the domestically developed assessment systems. Number of registered and certified green buildings is provided in Tables 1–5.

### Scandinavian countries:

**Table 1.** LEED Projects (Developed by authors)

Award	Denmark	Norway	Sweden
LEED Certified	21	6	14
LEED Silver	1	2	53
LEED Gold	5	2	159
LEED Platinum	5	1	32
<b>Total</b>	<b>32</b>	<b>11</b>	<b>258</b>

**Table 2.** BREEAM Projects (Developed by authors)

Award	Denmark	Norway	Sweden
Unclassified	0	0	0
Acceptable	0	0	26
Pass	2	4	88
Good	7	17	244
Very Good	5	78	137
Excellent	2	51	44
Outstanding	0	4	10
<b>Total</b>	<b>16</b>	<b>154</b>	<b>549</b>

**Table 3.** DGNB Projects (Developed by authors)

Award	Denmark	Norway	Sweden
Diamond	0	–	–
Platinum	0	–	–
Gold	1	–	–
Silver	21	–	–
Bronze	2	–	–
<b>Total</b>	<b>24</b>	–	–

**The Baltic States:****Table 4.** LEED Projects (Developed by authors)

Award	Estonia	Latvia	Lithuania
LEED Certified	1	0	0
LEED Silver	2	0	0
LEED Gold	3	0	0
LEED Platinum	1	0	0
<b>Total</b>	<b>7</b>	<b>0</b>	<b>0</b>

**Table 5.** BREEAM Projects (Developed by authors)

Award	Estonia	Latvia	Lithuania
Unclassified	0	0	0
Acceptable	0	0	0
Pass	0	2	1
Good	2	0	3
Very Good	1	4	24
Excellent	0	2	9
Outstanding	0	0	1
<b>Total</b>	<b>3</b>	<b>8</b>	<b>38</b>

Even though the Green Building Councils of the Baltic countries consider DGNB system as one of the ideal systems to rate their buildings and projects, there are no such registered projects in any of the Baltic countries.

**4. ANALYSIS OF THE ACTIVITIES OF GREEN BUILDING COUNCILS****Latvian Sustainable Building Council**

The Latvian Sustainable Building Council (LSBC) was founded in 2010 to promote the practice of sustainable construction. The LSBC has prioritised the four targets for the next five years, which are shown below (Latvian Sustainable Building Council, n. d.):

- Promoting the ideas and organisations in the favour of sustainable and green construction;
- By the help of cooperation of different sectors, like the Cabinet of Ministers Regulations on Green Procurement, Energy Efficiency Law, Construction Law etc., influencing the construction legislation;
- Making standards in favour of green construction and legalising it;
- Promoting the use of new technologies and innovations in favour of green construction.

The Latvian Sustainable Building Council along with other partners implements the project “The Most Sustainable Project/Buildings in Latvia” (Ilgtspējīgākais projekts Latvijā) on a yearly basis. However, there has been no update of any projects since 2017 at the official site of the LSBC. In total, there have been 20 projects, which are listed at the official site of the LSBC (Sustainable Buildings, Latvian Sustainable Building Council, n. d.).

Within the Improvement of the Latvian Long-term Strategy for Building Renovation for 2014–2020, the LSBC has declared the types of funds for renovation of different types of buildings in Latvia. Renovation costs and funding for improvement in Latvian buildings are shown in Table 7, and the purpose behind the funds is briefly defined below the table.

**Table 7.** Renovation Costs and Funding  
(Latvian Sustainable Building Council, 2014)

Types of buildings	Funds (EUR)
Multi-dwelling buildings	EU 2014–2020: 166 470 588 ERDF: 141 499 999 State Fund: 24 970 589
Public buildings	ERDF: 70 226 502 State Fund: 12 392 913
Municipal buildings	ERDF: 46 996 394 State Fund: 8 293 482
Industrial buildings	Cohesion Fund: 32 555 030 Private Fund: 5 745 006

These funds are used for a long-term improvement of the buildings. The different types of renovation carried out during the period of 2014–2020 are (Latvian Sustainable Building Council, 2014):

- Multi-dwelling buildings: Increasing energy efficiency by the help of insulation (13476 households).
- Public buildings: Smart energy management and use of renewable sources for energy.
- Municipal buildings: Improvement of energy efficiency and reduction of municipal costs for heat supply.
- Industrial buildings: Improvement of energy efficiency, certification of energy performance of buildings and raising energy efficiency during construction, as well as utilising renewable sources for the purchase and installation of modern and efficient heating and hot water production units.

### **Lithuanian Green Building Council**

The Lithuanian Green Building Council was founded in 2013 as a non-governmental organisation to influence and create sustainable environments along with promoting innovations in the phases of design, construction and operation (Lithuanian Green Building Council, n. d.).

Brief discussion about the goals of the non-governmental organisation is initiated at the available online source of the Lithuanian Green Building Council. The Code of Ethics is discussed just like any other GBC, but the document is written in their native language. Few advantages are shared for using the Lithuanian Building Sustainability Assessment System (LBSAS), which are covered in three parts and they are as follows (Lithuanian Building Assessment System, n. d.):

- Marketability: *“Adapted specifically to Lithuania, taking into account natural conditions, legal environment and local market needs”*;
- Quality and Best Practice: *“Developed by the experts of the Lithuanian Green Building Council in accordance with internationally recognised assessment methodologies and best practices”*;
- Economic and Ecological Benefits: *“Encourages the design and construction of healthy, comfortable, long-lasting, cost-effective, energy efficient buildings that rationally use natural resources at all stages of the life-cycle of the building”*.

The advantages of using the LBSAS are well defined, but there is only one project certified by this assessment system (Green Building Map, Lithuanian Green Building Council, n. d.), and there are 35 members in the Lithuanian Green Building Council. On a yearly basis, the Lithuanian Green Building Council holds a competition, i.e., “Green Buildings in Lithuania”. The evaluation criteria of this competition are made according to the different types of real estate objects, which are residential, administrative, commercial, industrial and building projects. The criteria for assessing these buildings are as follows (Competition Green Buildings in Lithuania, n. d.):

- Energy;
- Water;
- Materials;
- Plot;
- Transportation;
- Interior;
- Waste Disposal;
- Certificates;
- Designing Technologies;
- Building Aesthetics.

Owing to this competition, there are a few green buildings in Lithuania; according to the results of 2017, Duetto Business Centre (Duetto verslo centras) has become the greenest building in Lithuania. There is no information about the previous and future funding as well. The unclear aspect of analysing the LGBC was about the number of certified LEED and BREEAM buildings. Official websites of LEED and BREEAM had different numbers compared to the official site of the Lithuanian Green Building.

### **Estonian Green Building Council**

The Estonian Green Building Council was first on the news in 2013, when they organised an event named “World Green Building Week”. The Green Building Council is like other GBCs in the world, which focuses on the sustainable development of the country. The achievements and goals set make GBCs differ from each other. Therefore, the goals of the Estonian Green Building Council are shown in Table 8.

**Table 8.** EGBC Targets (Goals, Estonian Green Building Council, n. d.)

<b>Export, finance and business development</b>	<b>Quality and innovation</b>	<b>Law</b>
<ul style="list-style-type: none"> <li>– Creating business opportunities in energy sectors and the Estonian real estate.</li> <li>– Bringing new investment to new projects, which increases job opportunities in Estonia.</li> <li>– Using innovation as a tool to reduce cost in all phases of the project.</li> <li>– Enforcing sustainability in all types of projects (low/high)</li> </ul>	<ul style="list-style-type: none"> <li>– Using building information modelling and other automated systems in all phases of project.</li> <li>– Certifying the projects according to their quality and the Estonian standards.</li> <li>– Introducing innovation in real estate and energy sector, and improving the life cycle of the projects.</li> <li>– Having a positive impact on the social, environmental and economic status by the help of innovation.</li> <li>– Being the main leader of innovations and techniques in the real estate business</li> </ul>	<ul style="list-style-type: none"> <li>– Influencing the law-making process to make the investment in the real estate business friendly.</li> <li>– Working on a better regulatory environment in Estonia.</li> <li>– Playing a vital role in assisting the industries and asking the government for collaboration.</li> <li>– Analysing and guiding the government in using the European Union standards or other regulations</li> </ul>

The goals set by the Estonian Green Building Council do not have a specific timeframe.

There are 32 projects that are certified and listed at the website of the Estonian Green Council, but surprisingly most of the projects are situated in the neighbouring country, i.e., Latvia.

KEN cluster was developed by the Estonian Green Building Council to have sustainability in a complete life cycle of the project (KEN cluster, Estonian Green Building Council, n. d.). KEN cluster, which is also known as Kinnisvara-Energia cluster, is supported by the European Regional Development Fund in the amount of 297 500 EUR. It is unclear whether the amount granted by the European Regional Development Fund is received on a yearly basis or distributed throughout the period of 2014–2020. KEN cluster and their members with the fund will only focus on (Development of Cluster, Enterprise Estonia, n. d.):

1. ICT Cluster;
2. Estonian Smart City Cluster;
3. Digital Construction Cluster;
4. Connected Health Cluster;
5. SportEST-Health for Active Life Innovation Cluster;
6. Wooden Houses Cluster;
7. Development Cluster of the Woodworking Industry;
8. Defence and Security Cluster;
9. ESTRONICS;
10. Real Estate and Energy Cluster KEN;
11. Medicine Estonia;
12. Estonian Wind Technology Cluster.

It is clear that KEN cluster will use the funds and time towards sustainability and green buildings in the coming years of Estonia.

### **Summary of the Baltic Countries**

There is a mismatch in the number of the registered green buildings at the official sites of the Green Building Council and the respective assessment system sites, which are BREEAM, LEED etc. For example, according to website of the Lithuanian Green Building Council (LGBC), the total number of BREEAM certified buildings is 49 in Lithuania, whereas, according to the BREEAM official site, Lithuania has only 38 certified projects. Similarly, according to the LGBC, there are 10 LEED certified buildings in Lithuania; however, the official LEED site shows 0 certified projects. All the Baltic States have different numbers compared to the official assessment system sites.

The goals and plans are very crucial to declare so that any stakeholder remains well informed about the tasks and plans regarding the Green Building Council of any state. Only Latvia have made such plans and uploaded them at its official website. It is also important to declare the time period of the plan so that there is clarity on the intentions of the GBCs. The Estonian Green Building Council has not had any period set for their goals, so it is difficult to understand its current and future plans. The Lithuanian Green Building Council does not have documents about the future or current goals at its website. The quality of information fetched from the official site of GBCs during the analysis is poor as all the states have better priority for their native readers. The level of information and quality of data drastically differs when choosing the English version of the site.

### **Scandinavian States**

#### **Swedish Green Building Council**

The Swedish Green Building Council was established in 2011. The goals of the SGBC for 2018–2022 are as follows (Program for 2018–2022, Swedish Green Building Council, 2017):

- Certifying relevant buildings, infrastructure and districts;
- Provide training and courses;
- Provide advice for urban planning;
- Offering networking opportunities to increase and share knowledge.

The above-mentioned plans are briefly defined in the paper, but no investment backing is shown in the document to solidify the plans. However, there are important points mentioned in the document regarding sustainable development such as (Program for 2018–2022, Swedish Green Building Council, 2017):

- To have durable businesses across the country by sharing knowledge and making new tools to tackle new challenges;
- To reduce fossil fuel dependency without upsetting the growth of the country;
- To develop new environment-friendly houses;
- To reduce an interest rate for financing green projects;
- To use eco-friendly materials for well-being of the society.

Taking the initiative to work or influence at so many different levels within such a short time period can be challenging but not impossible. The SGBC organises various other events, such as Sweden Building Awards, in which individuals have to buy tickets to be in the event and there are also other events that are organised in a similar way by the SGBC, such as conferences, meetings etc. The financial gains by the help of events can be very useful in the long run for the SGBC to run the organisation independently. The trend of mismatch in the number of certified buildings by various assessment systems continues as there are different numbers shown at the SGBC site compared to building assessment system companies.

### **Norwegian Green Building Council**

The Norwegian Green Building Council (NGBC) performs the five main activities to reach its goals, which are (Norwegian Green Building Council, n. d.):

- To inspire and provide knowledge to their members;
- To increase networking among members for more knowledge and experience sharing;
- To bring more sustainability framework within the country by the help of responsible authorities;
- To have more innovative approaches;
- To provide tools as well as sustainability certification system.

The above-mentioned activities are very generally defined by NGBC. As the aim of different Green Building Councils varies from country to country, the activities should also differ. Therefore, it would be interesting to see more detailed information on activities. There are some goals set by the Norwegian Green Building Council, which are (Norwegian Green Building Council, n. d.):

- *A climate-neutral Norway in 2050;*
- *40 % reduction of greenhouse gas emissions in 2030;*
- *Closed material circulation in 2050;*
- *Zero emissions of pollutants by 2050;*
- *No emissions of greenhouse gases by 2050;*
- *Creating health by promoting buildings and surroundings;*
- *Providing a long-term value to society.*

Few goals do not have a specific year or date specified, but the specified NGBC aims were entitled in the real estate sector's road map 2050. There is also a mismatch in the number of buildings certified by BREEAM-NOR at official websites of BREEAM and NGBC, but this time less projects have been shown at the NGBC site and therefore the NGBC site must be updated. The important document posted at the official NGBC site is the Technical Manual of BREEAM-NOR for new construction in which almost all the technical specifications for construction are listed by keeping sustainability as their priority. There are no funds indicated by the NGBC to carry on their tasks for their goals.

### **Green Building Council Denmark**

Green Building Council Denmark (DK-GBC) has two sub-categories listed as vision and mission to its goals. The vision mentioned is as follows (Green Building Council Denmark, n. d.):

- To be the main catalyst in expanding the green development in Denmark;
- To have an impact on global market by covering the Danish construction industry;
- To build standards for sustainable construction which can be used nationally and internationally;
- To build environments, which are adaptable towards climate change, waste production, degraded environment, health and safety, and quality of life.

The mission of DK-GBC is as follows:

- To change the attitude of organisations towards sustainable choices;
- To use DGNB for construction and renovation;
- To have an impact politically and change the legislation by increasing the standards of sustainable construction.

There is no timeframe mentioned in either vision or mission of DK-GBC. There are also no documents uploaded on the strategy section of the DK-GBC official site. The vision and mission of DK-GBC are attractive, but there are no investment and use of funds shown at the site. Surprisingly, the certified projects are not mentioned by the DK-GBC at its official site.

### **Summary of the Scandinavian Countries**

Language remains a barrier in analysing and understanding the true meaning of many sentences. The number of certified green projects at the official website of regional Green Building Councils differs a lot from the official assessment sites, such as DGNB, BREEAM etc. Therefore, it must be updated regularly. Funds are the major drivers to influence any strategy mentioned by the Green Building Councils of Scandinavia. The events organised by the GBCs have some income as well. It is crucial to make the stakeholders aware of their gained funds. Official documents of the plans should be released in the official and English languages to show the goals, objectives and plans for the future contribution by the GBCs.

It is vital to understand the use of assessment system properly like Miljöbyggnad of Sweden, DGNB of Denmark and BREEAM-NOR of Norway, which GBCs of the Scandinavian countries have done accordingly.

## **CONCLUSION**

The Green Building Councils of both Scandinavian countries and Baltic States are reasonably working towards the development of green buildings. The Latvian Sustainable Building Council has shown the use of funds for renovation and construction with details of type of funds. Comparing the goals and activities held by the GBCs, Scandinavian GBCs have high aims, such as green certifying projects and districts (Sweden), zero pollutant emissions by 2050 (Norway), making sustainable construction standards for national and international projects (Denmark). Most of the goals of the Scandinavian and Baltic States were similar to each other. Though the goals differed, the activities carried out by both the Scandinavian and Baltic States were equal, such as knowledge sharing, educational

activities, best project events etc. Only Lithuania and Sweden have adapted their version of assessment system for their regional projects (Miljöbyggnad, Lietuvos Pastatu Tvarumo Vertinimo Sistema), but other Scandinavian countries have also either collaborated or recognised their assessment system (BREEAM-NOR, DGNB-Denmark). Latvian GBC uses BREEAM-LV Estonia has yet to officially confirm its own assessment system with collaboration with any international system.

Sweden has the highest number of green building projects comparing to other Scandinavian and Baltic countries. Even though DGNB has been recognised as the most suitable assessment system in Denmark, there are more LEED projects (32) compared to DGNB (24). The Green Building Council of the Baltic States has to work a lot in coming years to be comparable with the Scandinavian countries in terms of a number of certified projects. For the market analysis of green buildings of different regions, gaps in information flows can still be found. Therefore, a possible way to analyse the green building market is to trace the activities of the stakeholders and their plans according to the green building certification.

### CONFLICT OF INTEREST

Authors have personal and professional relationship with Editor-in-Chief of the journal. In this case, editorial process was carried out by Dr. Gita Actiņa, an Editorial Board Member of the Journal, who was invited to check the submission, recommend reviewers and make a final decision regarding the publication of this manuscript.

### REFERENCES

- British Research Establishment Environment Assessment Method. n.d. *BREEAM category issues and aims*. Retrieved from <https://www.breeam.com/discover/how-breeam-certification-works/>
- British Research Establishment Environment Method. (n. d.). *The Aim of BREEAM*. Retrieved from <https://www.breeam.com/>
- British Research Establishment Environment Assessment Method, (2011). *Scoring and Rating BREEAM assessed buildings*. Retrieved from [https://www.breeam.com/BREEAM2011SchemeDocument/Content/03\\_ScoringRating/scoring.htm](https://www.breeam.com/BREEAM2011SchemeDocument/Content/03_ScoringRating/scoring.htm)
- Deutsche Gesellschaft für Nachhaltiges Bauen. (2018). *The DGNB System: Global Benchmark for Sustainability*. Retrieved from [http://www.dgnb-system.de/en/system/certification\\_system/](http://www.dgnb-system.de/en/system/certification_system/)
- DLA Pipers Sweden. (2018). *Real World Law: Full Hand Book*. Retrieved from <http://www.dlapiperrealworld.com/law/index.html?t=construction&s=legal-framework&q=environmental-assessment-and-sustainability&c=SE#>
- DLA Pipers. (2018). *Norway, Real World Law: Full Hand Book*. Retrieved from <http://www.dlapiperrealworld.com/law/index.html?t=construction&s=legal-framework&q=environmental-assessment-and-sustainability&c=NO>
- Enterprise Estonia. (n. d.). *Development of cluster*. Retrieved from <https://www.eas.ee/teenus/development-of-clusters/?lang=en>
- Environment Performance Index. (2014). *Country Ranking*. Retrieved from <http://archive.epi.yale.edu/epi/country-rankings>
- Estonian Green Building Council. (n. d.). *Eesti Goals*. Retrieved from [http://www.gbc.ee/gbc\\_eng.html](http://www.gbc.ee/gbc_eng.html)
- Estonian Green Building Council. (n. d.). *Goals*. Retrieved from [http://www.gbc.ee/gbc\\_eng.html](http://www.gbc.ee/gbc_eng.html)

- Estonian Green Building Council. (n. d.). *KEN cluster*. Retrieved from <http://www.gbc.ee/726eng.html>
- Eurostat (January 2018). *Environmental Tax Revenues*. Retrieved from [http://ec.europa.eu/eurostat/data/database?node\\_code=env\\_ac\\_tax#](http://ec.europa.eu/eurostat/data/database?node_code=env_ac_tax#)
- Government offices of Sweden, Swedish National Report. (2016). *Sweden's National Report for the third United Nations Conference on Housing and Sustainable Urban Development. Habitat III*. Retrieved from <http://www.government.se/reports/2016/10/swedens-national-report-for-the-third-united-nations-conference-on-housing-and-sustainable-urban-development/>
- Green Building Council Denmark. (n. d.) *Certified Projects*. Retrieved from [http://www.dgnbssystem.de/en/projects/index.php?filter\\_Freitextsuche=&filter\\_Land=D%C3%A4nemark&filter\\_Bundesland=&filter\\_Standort=&filter\\_Jahr=&filter\\_Zertifizierungsart=&filter\\_Nutzungsprofil=&filter\\_Zertifiziert\\_von\\_1=&filter\\_Verliehenes\\_Guetesiegel=&filter\\_Architekt=](http://www.dgnbssystem.de/en/projects/index.php?filter_Freitextsuche=&filter_Land=D%C3%A4nemark&filter_Bundesland=&filter_Standort=&filter_Jahr=&filter_Zertifizierungsart=&filter_Nutzungsprofil=&filter_Zertifiziert_von_1=&filter_Verliehenes_Guetesiegel=&filter_Architekt=)
- Green Building Council Denmark. (n. d.). *About us*. Retrieved from <http://www.dk-gbc.dk/om-green-building-council-denmark/>
- Green Building Council Denmark. (n. d.). *Vision and Mission*. Retrieved from <http://www.dk-gbc.dk/om-green-building-council-denmark/vision-og-mission/>
- Kauškale, L., & Geipele, I. (2017). Integrated Approach of Real Estate Market Analysis in Sustainable Development Context for Decision Making. *Procedia Engineering*, 172, 505–512. ISSN 1877-7058. <https://doi.org/doi.org/10.1016/j.proeng.2017.02.059>
- Hydes, K., Richardson, G. R. A., & Petinelli, G. (2018). *World Green Building Council: Supporting the Sustainable Transformation of the Global Property Market*. Retrieved from <http://www.irbnet.de/daten/iconda/CIB7984.pdf>
- Latvia Sustainable Building Council. (n. d.). *About us*. Retrieved from <http://www.ibp.lv/en>
- Latvian Sustainable Building Council. (n. d.). *Bulletin "Latvia's Sustainable Construction Council": Priority directions for next 5 years*. Retrieved from <http://www.ibp.lv/lv/pardums/darbiba-un-biedri/>
- Latvian Sustainable Building Council. (2014). *The Improvement of the Latvian Long-Term Strategy for Building Renovation for 2014–2020*. Retrieved from <http://www.ibp.lv/files/download/394>
- Latvian Sustainable Building Council. (n. d.). *Sustainable Buildings*. Retrieved from <http://www.ibp.lv/lv/ilgtspējīgas-ekas/>
- Leadership in Energy and Environment Design. (n. d.). *LEED is Green Building*. Retrieved from <https://new.usgbc.org/leed>
- Lithuanian Green Building Council. (n. d.). *About us*. Retrieved from <http://lzpt.lt/about-us/>
- Lithuanian Green Building Council. (n. d.). *Competition Green Buildings in Lithuania*. Retrieved from <http://lzpt.lt/veikla/#konkursas>
- Lithuanian Green Building Council. (n. d.). *Green Building Map*. Reference: <http://lzpt.lt/zaliuju-pastatu-zemelapis/>
- Lithuanian Green Building Council. (n. d.). *Lithuanian Building Assessment System*. Retrieved from <http://lzpt.lt/about-us/>
- Lithuanian Green Building Council. (n. d.). *Lithuanian Sustainability Assessment System*. Retrieved from <http://lzpt.lt/about-us/>
- Dwaikat, L. N., & Ali, K. N. (2016). Green buildings cost premium: A review of empirical evidence. *Energy and Buildings*, 110, 396–403. <https://doi.org/doi.org/10.1016/j.enbuild.2015.11.021>
- Ministry of Enterprise and Innovation. (n. d.). *Sustainable Business- the Government's Policy for Sustainable Business*. Retrieved from [https://www.government.se/49171b/contentassets/c2dc5f1cb30b40fb941aa2796c4387ae/sustainable-business\\_webb.pdf](https://www.government.se/49171b/contentassets/c2dc5f1cb30b40fb941aa2796c4387ae/sustainable-business_webb.pdf)
- Nordic Innovation. (2012). *Survey of Green Legislation and Standards in the Construction Area in the Nordic Countries*. Retrieved from [http://nordicinnovation.org/Global/Publications/Reports/2012/2012\\_10%20Survey%20of%20green%20legislation%20and%20standards%20in%20the%20construction%20area%20in%20the%20Nordic%20countries.pdf](http://nordicinnovation.org/Global/Publications/Reports/2012/2012_10%20Survey%20of%20green%20legislation%20and%20standards%20in%20the%20construction%20area%20in%20the%20Nordic%20countries.pdf)
- Norway Green Building Council. (n. d.). *About us*. Retrieved from <http://ngbc.no/om-norwegian-green-building-council/>

- Norway Green Building Council. (n. d.). *BREEAM-NOR Certified Projects*. Retrieved from <http://ngbc.no/klassifiserte-breeam-nor-prosjekter/>
- Norwegian Green Building Council. (n. d.). *Important Information to Our Members*. Retrieved from <http://ngbc.no/om-norwegian-green-building-council/>
- MacNaughton, P., Satish, U., Laurent, J. G. C., Flanigan, S., Vallarino, J., Coull, B., Spengler, J. D., & Allen, J. G. (2017). The Impact of Working in a Green Certified Building on Cognitive Function and Health. *Building and Environment*, 114, 178–186. <https://doi.org/doi.org/10.1016/j.buildenv.2016.11.041>
- RobecoSAM. (November 2017). *Sustainability Rankings of the Countries*. Retrieved from [http://www.robecosam.com/images/Country\\_Ranking\\_Update\\_October\\_2017.pdf](http://www.robecosam.com/images/Country_Ranking_Update_October_2017.pdf)
- Solability. (2017). *Global Sustainable Competitive Index*. Retrieved from <http://solability.com/the-global-sustainable-competitiveness-index/the-index>
- Swedish Energy Agency. (2018). *Energy in Sweden – Facts and Figures*. Retrieved from <http://www.energimyndigheten.se/en/news/2018/energy-in-sweden---facts-and-figures-2018-available-now/>
- Swedish Green Building Council. (2017). *Program for 2018–2022*. Retrieved from <https://www.sgbc.se/docman/om-sgbc-2018/1062-program-sgbc-2018-2022/file>
- Swedish Green Building Council. (n. d.). *Program for 2017–2021*. Retrieved from <https://www.sgbc.se/docman/stamma-2017/904-sgbc-program-2017-2021/file>
- The Swedish Environmental Code. (1999). *The Government of Sweden*. Retrieved from <https://www.government.se/contentassets/be5e4d4ebdb4499f8d6365720ae68724/the-swedish-environmental-code-ds-200061>
- The Swedish National Board of Housing, Building and Planning. (2011). *Requirement for Indoor Climate for Swedish Buildings (2011:26)*. Retrieved from <https://www.boverket.se/globalassets/publikationer/dokument/2012/bbr-engelsk/bfs-2011-26-eng-avsnitt6.pdf>
- World Green Building Council (WGBC). (2016). *Benefits of Green Buildings*. Retrieved from <http://www.worldgbc.org/benefits-green-buildings>
- World Green Building Council. (2017). *Annual Report*. Retrieved from <http://www.worldgbc.org/news-media/worldgbc-annual-report-201617>
- World Green Building Council. (n. d.). *Our Green Building Councils*. Retrieved from <http://www.worldgbc.org/our-green-building-councils>
- Li, Y., Chen, X., Wang, X., Xu, Y., & Chen, P.-H., (2017). A Review of Studies on Green Building Assessment Methods by Comparative Analysis. *Energy and Buildings*, 146. <https://doi.org/doi.org/10.1016/j.enbuild.2017.04.076>

## AUTHORS' SHORT BIOGRAPHIES

**Ankit Mishra** is a first-year Economics and Entrepreneurship Ph.D. student at Riga Technical University. He has previously completed his Master's studies at Riga Technical University within the programme "Civil Construction and Real Estate Management". He has background of a Civil Engineer as he has pursued his Bachelor of Technology in Civil Engineering and has relative work experience as a Civil Engineer. His previous article for Baltic Journal of Real Estate Economics and Construction Management in 2017 was "Comparative Analysis of Sustainable Real Estate Market in two Northern Capitals: Case of Riga, Latvia and Stockholm, Sweden". He has taken part in Scientific Conference on Economics and Entrepreneurship 2018 (SCEE'2018), which was the 59<sup>th</sup> International Scientific Conference of Riga Technical University. He has presented the results of "The Analysis of the Green Building Supporting Organizations in the Scandinavian Countries and Baltic States" and presented his abstract for "Adaptation of Tools in Spatial Planning". His research interests lie in economics, sustainable development, spatial development etc.

**Linda Kauškale**, Ph.D., is a Researcher and Lecturer at the Institute of Civil Engineering and Real Estate Economics, Faculty of Engineering Economics and Management, Riga Technical University. She with distinction obtained Professional Master Degree in Civil Construction and Real Estate Management with the qualification of Real Estate Economist. She has participated in international scientific conferences and seminars in Latvia, Germany, United Arab Emirates, Singapore, Malaysia, Lithuania, Spain, etc. Her main research areas are sustainable real estate market concept, sustainable cities and sustainable construction, green buildings, macroeconomic analysis, business cycle, decision-making, environmental development, etc. She is a DGNB (Deutsche Gesellschaft für Nachhaltiges Bauen – German Sustainable Building Council) Registered Professional. In autumn 2016, she was a DBU (German Environmental Foundation) Scholarship holder. In autumn 2013, she was a FIABCI Scholar.

ORCID iD: <http://orcid.org/0000-0002-0280-2977>