DGNB VS. LEED: A COMPARATIVE ANALYSIS

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Summary

Nowadays, with an intensifying climate change, resources running short, economic complexity and debts going sky high, the idea of "sustainability" becomes more and more important. However, the views on this topic are inconsistent and partially affecting themselves. In the building sector – with its high demand for energy as well as resources and corresponding costs – the issue is also on the agenda. There are plenty of approaches and methods how to measure, evaluate and control the impacts of buildings on the environment. Most promising are rating methods for a standardized and scientific based assessment of buildings. In Germany for example the so called "energy certificate" intends to create transparency regarding the energy efficiency of buildings.

To promote sustainable buildings, several organizations were founded in the past years, developing implementation strategies in the form of certification systems, based on ecological, economical and social aspects. In 1999 the World Green Building Council (WGBC) based in Canada was founded. Essential objectives are the promotion of sustainable buildings, transfer of information and innovation between the countries as well as the support of effective certification systems. The members support measurable and assessable buildings by the development and enhancement of certification systems or alternatively the adaptation of existing systems to the requirements of their countries.

In Germany the German Sustainable Building Council (DGNB) was founded three years ago. It is a WGBC member and meanwhile offers the assessment method "German Sustainable Building Certification". The system aims to close the gap left by well established methods like the Building Research Establishment Environmental Assessment Method (BREEAM) or the Leadership in Energy and Environmental Design (LEED): the assessment of a building's whole life-cycle.

This comparative overview shows the standards and guidelines the systems are based on, their main targets, the weightings of the indicators and also which aspects are neclected.

Keywords: DGNB, LEED, Assessment, Certification

1 The German Sustainable Building Certification

1.1 History and Development

In 2007 the German Sustainable Building Council (DGNB) was founded. It is based in Stuttgart. In cooperation with the Federal Ministry of Transport, Building and Urban Affairs (BMVBS) the DGNB developed a comprehensive method for the assessment of sustainable buildings. In comparison to e.g. the BRE Environmental Assessment Method (BREEAM) or the Leadership in Energy and Environmental Design (LEED) it is an

evaluation system of the second generation, which means especially that it emphasises an integrated view over the whole life-cycle of the building. The first version was published in 2008 and called "New Construction of Office and Administration Building, Version 2008". Other versions for other building types like hotels, schools, homes, factories or retail are currently in the pilot and / or evaluation phase [1].

The non-profit organization DGNB has currently more than 800 members and almost 150 auditors.

1.2 Structure

The "German Sustainable Building Certification" is based on the three classic columns of sustainability: ecology, economy and social aspects. In addition to them there were created two cross section categories targeting aspects of the technique and of the process. The location is assessed in an extra grade. In conclusion there are now six topics: Ecological Quality, Economical Quality, Socio-cultural and Functional Quality, Technical Quality, Quality of the Process and Quality of the Location. These topics are subdivided in criteria groups and the criterions which are relevant for the certification. In the criterions are listed the indicators that are evaluated either qualitatively or quantitatively. Each criterion has a value of ten points. To ensure flexibility of the assessment, each criterion can be weighted depending on the relevance for the building type from 0 to 3. Altogether there are currently 49 from 63 criterions activated.

The six topics are weighted in the following way: Ecological Quality: 22,5 %, Economical Quality: 22,5 %, Socio-cultural and functional Quality: 22,5 %, Technical Quality: 22,5 %, Quality of the Process: 10 % and Quality of the Location: Extra Note [2].

1.3 Certification Process

Every builder who wants to aquire a seal of quality for his building, hires an accredited DGNB auditor who leads him during the certification process. At first the building has to be registered online at the DGNB by the auditor.

The building owner and the auditor determine together the targets of the design and write them down. The earlier the criterions of the system are considered the more influence for a sustainable building is possible. After the building is completed and the documentation sent to the DGNB, the building can be certificated with a seal in gold, silver or bronze.

As long as the building is in an early planning phase a pre-certificate can be accomplished. Therefore binding declarations concerning the building design have to be sent to the DGNB and the pre-certificate in gold, silver or bronze can be issued. The building owner is allowed to use it for marketing purposes. The pre-certificate is not necessarily required to obtain the certificate. Depending on the degree of compliance the certifications are awarded according to the following scale: starting from 50 % = bronze, from 65 % = silver, from 80 % = gold [3].

2 Leadership in Energy and Environmental Design (LEED)

2.1 History and Development

The U.S. Green Building Council (USGBC) was founded in 1993. It is based in Washington and immediately started with the development of the sustainable building assessment system "Leadership in Energy and Environmental Design" (LEED) in confederation with architects, real estate merchants, homeowners, lawyers and representatives of the industry. The aim was to develop a method enabling to measure and compare "green buildings". Meanwhile the USGBC has over 20,000 members and more than 125,000 LEED Accredited Professionals (LEED AP). The assessment system has been published in 1998 as LEED Version 1.0, followed by Version 2.0 in 2000, Version 2.1 in 2002, Version 2.2 in 2005 and the actually valid Version 3.0 in 2009 [3].

2.2 Structure

The LEED certification system has been adopted for many building types: actually there is LEED Core&Shell, LEED New Construction, LEED Schools, LEED Retail, LEED Healthcare, LEED Commercial Interiors, LEED Homes, LEED Existing Buildings and LEED Neighborhood Development. The US-system is subdivided in five ecological categories and weighted by points: Sustainable Sites - 26 points, Water Efficiency - 10 points, Energy and Atmosphere - 35 points, Materials and Resources - 14 points, Indoor Environmental Quality - 15 points. Besides there are two more categories with 10 bonus points: Innovation in Design - 6 points, Regional Priority - 4 points. All categories contain prerequisites that are obligatory and credits which are free to be achieved. Altogether there is a gain of 110 points in 55 credits. Additionally 8 prerequisites have to be fulfilled. The points are weighted following the U.S. Environmental Protection Agency`s TRACI [4] environmental impact categories and according to the categories developed by the National Institute of Standard and Technology (NIST). Depending on the reached score there are four assembly levels: starting from 40 points = certified, from 50 points = silver, from 60 points = gold, from 80 points = platin [5].

2.3 Certification Process

For certification the building has to be registered online at the Green Building Certification Institute (GBCI). It is not necessary to integrate an LEED AP, but 1 point is assigned if one does. After the registration access is granted to a variety of software tools and necessary information. The certification can be divided into two parts: design and construction. The completed documentation can be submitted in LEED-Online. The GBCI is reviewing and evaluating the papers and each credit will be designated as either accepted or denied. In case of insufficient implementation the project team can supply corrective actions in addition. After fulfilling all prerequisites and the specific chosen credits, the certificate can be awarded. The option of a pre-certificate is given in the Version LEED Core&Shell [5].

3 Comparative Analysis

Being the younger system and having therefore the advantage to orientate itself to the findings of well established systems like LEED or BREEAM, the German assessment

method is more complete. It assesses the whole life-cycle of the building using multifaceted criterions, which are in itself more slenderly weighted. An exhaustive and detailed comparative analysis shows as a result that there are 24 criterions of the "German Sustainable Building Certificate" without any counterpart in LEED and vice versa only 6 credits in LEED standing alone. Also often more LEED credits are needed to cover one criterion of the "German Sustainable Building Certificate". Nevertheless the german system permits ampler scope in the field of planning, because the builder can often move in threshold values instead of putting in practice special kinds of guidelines.

The implementation and documentation of the aspects of both systems can be estimated as comparable, if they are taken into account in an early stage of planning. This observation only applies to certifications in the country of the origin of the system. For example, a LEED certification in Germany leads to additional expenses due to the fact that not only the German standards (like DIN V 18599) have to be fulfilled and documented but also the American standards (like ASHRAE 90.1). Furthermore all documents and plans have to be translated in the English language and the American system of units.

Tab. 1 Short overview: DGNB vs. LEED

Aspect	**DGNB, Version 2008**	**LEED, Version 3.0**
Organization - Members	German Sustainable Building Council (DGNB) - ~ 800	United States Green Building Council (USGBC) - ~ 20,000
First Publication	2008	1998
Certified Projects	~ 85	~ 2400
Accredited Auditors / Professionals - Required?	~ 150 - yes	~ 125,000 - no
Categories - Degree of Compliance [%]	Ecological Quality - 22,5 Economical Quality - 22,5 Socio-cultural and Functional Quality - 22,5 Technical Quality - 22,5 Quality of the Process - 10 Quality of the Location - extra	Sustainable Sites - 24 Water Efficiency - 9 Energy and Atmosphere - 32 Materials and Resources - 13 Indoor Environmental Quality - 14 Innovation in Design - 5 Regional Priority - 4
Number of Criterions / Prerequisites / Credits	49	63
Certificates - Degree of Compliance [%]	Bronze > 50 Silver > 65 Gold > 80	Certified > 36 Silver > 45 Gold > 55 Platin > 73
Costs in € [6]: Project Registration Pre-Certificate Certificate Appeals (per Credit) Software Handbook / Reference Guide Education Auditor / AP	 - 2,000 - 13,000 3,000 - 28,000 - 800 -over 4,000 290 - 580 3,000 - 7,500	 ~ 650 - 900 ~ 1,850 - 3,700 (Core&Shell) ~ 1,300 - 20,000 ~ 400 0 (LEED Online) ~ 100 - 150 ~ 300 - 410

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[6] Exchange Ratio: Euro/US-Dollar = 1,35