

More Than Green: The DGNB Certification System for Sustainable Buildings and Districts

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ABSTRACT

The sustainability concept of the DGNB system covers the well-known three-pillar model of ecology, economy and social issues, as well as technical quality, process quality and location features.

The system's holistic approach promotes innovation by focusing on overall building performance thus, promotes uncompromising quality, new ideas and innovative concepts. Order: Certification follows a holistic approach: the DGNB System assesses the entire life cycle of the building. This makes it possible to define sustainability goals right at the start in the planning phase.

Moreover the DGNB offers a tailored approach to suit Chinese green building policies, market requirements or climate conditions.

Several projects in China and other Asian countries have already been awarded with the DGNB Certificate.

In the paper, we are going to present our experience in the development and evaluation of sustainable buildings and districts and will give an outlook on new developments at the DGNB, like the certificate for "buildings in operation" or the guidance of design and quality of projects. Particularly latter emphasizes our focus not only on lowering resource consumption but also on how we feel in our buildings.

Keywords: certification system, life cycle assessment, DGNB

1. THE DGNB SYSTEM – A HOLISTIC APPROACH

Cities worldwide are facing major challenges due to increasing urbanisation. Traffic, smog, and polluted rivers are only some of the visible signs. The distinguishing features of today's future-oriented cities are that they offer resource and energy efficient construction and operating systems as well as enduring high living standards and distinctive quality of place. Achieving this offer requires proactive, comprehensive, and transparent planning.

1.1. DGNB System in general



Figure 1: The basic DGNB evaluation structure

The DGNB is the German and international knowledge platform for sustainable building and provides the world's most advanced sustainable building certification system. Its aim is the planning and assessment of sustainable buildings and districts. More than 1,200 projects worldwide are pre-certified or certified. Further the DGNB is market leader in Germany.

The certification schemes of the German Sustainable Building Council (DGNB) for buildings, districts and industrial locations help consider all aspects of sustainability early in the design phase. Aspects of a district or location's economic, environmental, socio-cultural, and technical qualities are given equal consideration throughout the entire life cycle. The DGNB assessment methodology also addresses the project's process quality and award certificates in silver, gold or platinum, according to the project's overall performance.

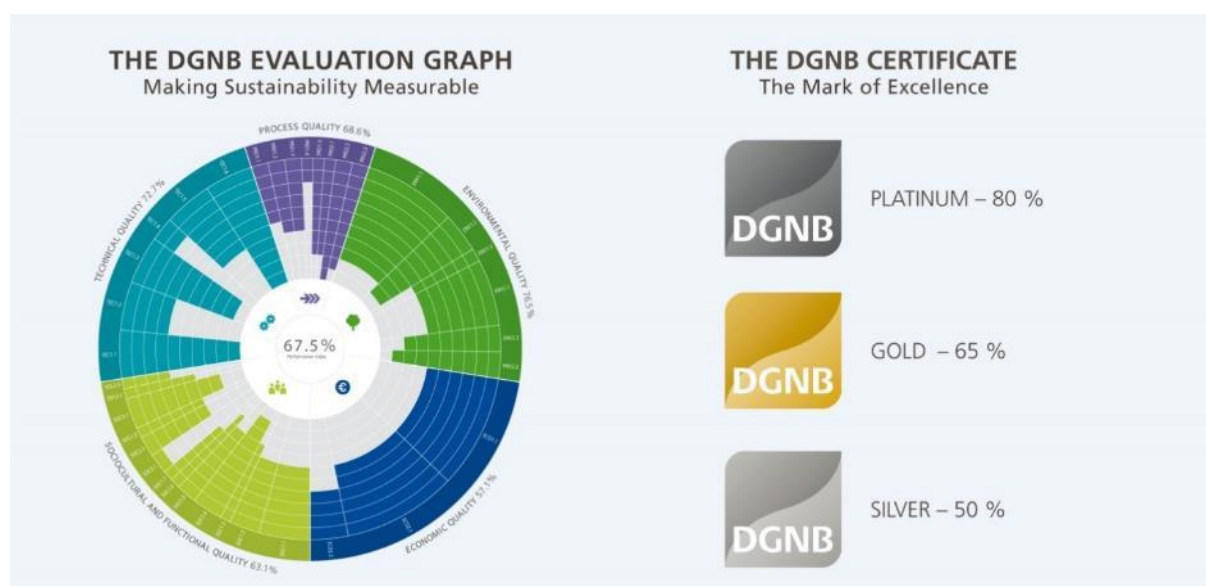


Figure 2: The DGNB evaluation graph and DGNB award's

1.2. From China to Brazil – The DGNB system’s global progress

The DGNB system’s unique holistic view of sustainability fundamentally sets it apart from other rating tools. For instance, the DGNB system gauges buildings’ and districts’ overall performance rather than allocating points for individual measures. This outcome-oriented flexibility promotes innovative and project-tailored solutions.

The certification system enables transparency, quality control, and eliminates planning risk from project conception to completion. In applying the criteria, the system evaluates all the relevant sustainability factors, and reflects costs and benefits over the district’s entire life cycle. Integrating aspects of sustainability, such as resource consumption, mobility, and future user needs in the early design stages results in greater user comfort and higher living standards as well as adding to the district’s financial value. This is sustainability “Made in Germany”.

1.3. The DGNB system – Where’s the difference?

In the public perception three of the world’s leading systems for certification of buildings as DGNB, LEED and BREEAM are often mentioned in the same breath. Besides the obvious similarities there are some fundamental differences between systems.

Sustainable vs. Green

The term "green building" is very closely linked to the area of energy efficiency, which can be only one aspect of sustainable construction. So the DGNB System is based on the classic understanding of sustainability with the triad of ecology, economy and social. For the purposes of the DGNB a building must always be designed and constructed that it

- Is built and can be operated environmentally friendly and resource-efficient,
- Economically viable, long-term cost-saving and flexible,
- Sets the man in focus by enabling health and comfort.

Life-cycle costs and life cycle assessment

The basic idea behind the DGNB System is the analysis of the entire lifecycle of a project. This begins with the extraction of raw materials and ends with the demolition of the building, and the recycling of components. For the other certification systems available on the market, this is done only to a lesser extent.

Better Projects vs. Individual measures

Whether a measure is useful for a project depends on a variety of factors. In this sense, no individual measures (for example, use of photovoltaic) but targets (for example, 50% less energy demand) are valued at the DGNB system. Here, the result is always evaluated, not the measure itself. The optimum for the individual project is left to the builder itself.

Adaptation of the requirements vs. One system for all

In more than 20 countries worldwide buildings have been certified with the DGNB system. The special, as compared to LEED is that the DGNB adapts the criteria on the regional circumstances. This includes, for example, the regulatory framework, the specific market conditions and the climatic conditions. In LEED projects for example you have to use US standards in Europe, which doesn’t make so much sense. Thus, it is not adapted to country-specific circumstances.

Measurement of indoor air quality

Because man is in focus, the indoor air quality is a very important point in the DGNB system. Here a real measurement of the pollutant content has been made in the air after completion of the building.

Serial and multiple certification

Furthermore, the DGNB provides a series or multiple certification for buildings that are identical but created at different locations. These include, for example, supermarkets or manufactured homes. There is the possibility of a simplified, faster and thus cost-effective certification of the individual buildings.

Design quality

As the first certification systems for sustainable buildings worldwide, the DGNB has launched a pilot phase to evaluate the design quality in 2015. Together with the Federal Chamber of Architects and in cooperation with the Association of German Architects BDA an appropriate methodology has been developed. One approach here are recommendations that are given to the project participants in parallel with the pre-certification at an early planning stage of a DGNB Design Committee

1.4. The DGNB systems for districts and industrial locations

The Urban Districts scheme focusses on the spaces between the buildings and the quality of the district's wider location as well as considering overarching concepts for energy, water, and waste, the urban climate, and biodiversity. The aim is to create urban districts which offer their inhabitants high quality of life while making the most efficient use of resources and protecting the environment. Buildings within the urban district are only considered in terms of their basic parameters and need not be certified for an urban district to achieve a DGNB certification.



Figure 3: Urban district "Carlsberg City District" in Copenhagen (DK),
Pre-certificate in Silver (© Carlsberg Byen p/s, rendering made by Entasis) AND Mairdar EcoCity+, near Ulaan Baatar (Mongolia), DGNB
Pre-certificate in platinum, © Mairdar City LCC

Business districts combine all aspects of an attractive work and leisure environment. Approaches to improve the quality of place, and the worker's child care and retail amenities are just as relevant as environmental performance and energy technology. Establishing synergies and mutually beneficial relationships between businesses and their urban setting is another important objective in designing sustainable districts. This efficiently reduces costs in the long term. The quality of life is consistently enhanced and joins forces with cost effectiveness and improved productivity to create decisive added value.

Industrial locations are moving ever closer to the heart of the sustainability debate. DGNB has developed criteria for industry which have been tested in pilot projects for companies such as Volkswagen, Daimler, and Porsche at locations in Germany and abroad. Next to the building's quality and resource requirements, this scheme takes open areas, infrastructure, urban context and planning and production processes into account.

Evaluation Area	No.	Criterion
Environmental Quality 22.5%	1	Life Cycle Assessment – emissions, environmental effects
	2	Biodiversity
	3	City climate
	4	Environmental risks
	5	Water and soil protection
	6	Life Cycle Assessment – resource consumption
	7	Water cycle systems
	8	Land use
Economic Quality 22.5%	9	Life Cycle Costs
	10	Fiscal Effects on the Municipality
	11	Resilience and adaptability
	12	Space efficiency
	13	Stability of value
Socio-cultural and Functional Quality 22.5%	14	Thermal comfort in open space
	15	Open space
	16	Emissions/ immissions
	17	Accessibility
	18	Urban Design
	19	Social and functional mix
Technical Quality 22.5%	20	Social and economic infrastructure
	21	Energy infrastructure
	22	Waste Management
	23	Smart Infrastructure
	24	Mobility infrastructure I
Process Quality 10%	25	Mobility infrastructure II
	26	Integral planning
	27	Participation
	28	Project management
	29	Governance
	30	Monitoring

Table 1: Criteria overview of the DGNB Districts system, Version 2016

1.5. The DGNB system for buildings in use – Slim, practically oriented, economically

The new DGNB system "buildings in operation" complements existing DGNB certificates to the assessment of existing buildings with the focus on operational aspects. The usage profile is an easy to handle tool to evaluate and improve the sustainability of the building involving operators and users over only 9 criteria of the sustainability of buildings is evaluated in operation. Applicable for any type of building.

1.6. The DGNB award for design quality

To complement the existing certification system the DGNB takes also the design quality of a Building into account. This should be judged in addition to technical and often quantitative requirements for sustainable building now also the first time the qualitative aspects. There is a two-stage approach, responding to the following target groups:

- Projects at an early stage, which are registered for the DGNB pre-certificate or certificate.
- Projects after completion, which have already received a DGNB Certificate or are shortly before the test.

1.7. The use of the DGNB system in Asia

The unique feature of the DGNB system is its flexible structure, which allows it to adapt to country specific conditions. This is fundamental since a city in Asia, for example, is in many aspects – such as climatic, cultural, and legal frameworks – not comparable to a city in Europe.

The advantages of the DGNB system are now acknowledged by relevant bodies in the construction and real estate sectors. Particularly in Asia, the interest for the DGNB Certification system increased in recent years, and up to date several buildings have been certified or have started the certification process. Also, there are many requests for certification of urban districts and industrial locations. One of these projects is the Sino-German Ecopark in Qingdao (CN) for instance.

To increase awareness about sustainable construction and the DGNB System in China, the DGNB regularly offers training events on related topics. In addition, the DGNB is continuously expanding its network to governmental and non-governmental organisations in Asia, such as Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). It also takes part on relevant events such as the “BAU Congress China” and the “China Green Building Conference”.

Reference Projects in China and Mongolia: The most advanced sustainable building certification system – made in Germany, applied in China:

- Maidar EcoCity+, global model of sustainable urban development, 300.000 Inhabitants, DGNB Pre-Certificate in Platinum, 30 km to the south of the capital Ulaan Baatar (Mongolia)
- The Bruck Passive House residential building, DGNB Certificate in Platinum, Region of Changxing (China)
- German Enterprise Centre, Mixed-used Building, DGNB Certificate in Platinum, Qingdao (China)
- BASF R&D Service Plattform, Laboratory Building, DGNB Pre-Certificate in Silver, Shanghai (China)



Figure 4: Awarding ceremony, Passivhouse Bruck (Landsea), Changxing (CN), DGNB Certificate



Figure 5: The German Enterprise Centre, Qingdao, DGNB Pre-certificate, Source: Sino-German Ecopark Real Estate AND BASF R&D Center Shanghai, DGNB Certificate, Source: BASF

The most advanced sustainable building certification system – made in Germany, applied in China:

- Internationally recognised quality standard for excellence
- Tailored to suit Chinese green building policies, market requirements and climate conditions
- More than 1,200 certified projects worldwide
- 200 Chinese experts trained as DGNB Consultants
- Holistic approach facilitates focusing on overall building performance

2. DGNB ACADEMY – KNOWLEDGE ON SUSTAINABLE CONSTRUCTION

The key to sustainable building goes beyond the projects that are submitted for certification. Trained experts are needed who understand where changes are required in order to ensure that sustainability is more deeply embedded during planning and construction.

With this goal in mind, the DGNB offers a targeted training concept for Chinese experts that enables them to qualify as a DGNB Consultant. Over the course of three days, the participants are taught everything there is to know about the application of the certification system. The training is aimed at all actors involved in the construction process, from the planning and construction to the operation of sustainable buildings or districts. In the design and planning processes, the DGNB Consultant is responsible for the implementation of the DGNB's requirements and priorities.

The training aims at enabling the participants to apply appropriate strategies to effectively address the impacts and interdependencies between social, economic and ecological sustainability criteria in the planning and construction phases. At the same time they learn to use the DGNB System as a planning tool. As early as in the design phase, they will be able to identify optimization potential that can improve the performance and quality of the project.