



Green office buildings with LEED

How to design and construct new office buildings in a sustainable way: a guide to LEED certification

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1 INTRODUCTION

Buildings are estimated to use approximately 40% of global energy, 25% of global water and 40% of global resources. Also buildings are accountable for approximately one third of total greenhouse gas emissions (UNEP, 2016). There is a growing awareness within construction sector about global warming and a paradigm shift towards the responsibility of the industry to reduce environmental effects. As a result of the need for more sustainable construction, mandatory certification has been introduced by governments. In the EU for example Energy Performance Certificates (EPC's) are required for many building when they are put up for sale. The resulting energy label and score gives an indication of the energy efficiency of the building. In the race towards sustainability the dialogue should not only be about the reduction of energy use, but also about other measures to minimize our impact on the environment.

It is difficult to compare the sustainability of buildings, so for this purpose several benchmarking methods have been developed. At this moment the most widely used methods to assess the sustainability of buildings are BREEAM and LEED. This report will treat the benchmarking system LEED and its application in new office building.

The main question is how to design and construct new office buildings in a sustainable way with LEED certification. For this purpose first the LEED certification system will be explained with its history and categories. Then it will be discussed for which buildings LEED is relevant. Some case studies for office buildings will be explained. And finally a more critical note: do buildings really become more sustainable by using LEED?

2 HOW DOES LEED CERTIFICATION WORK?

The world population is growing at a rapid pace, meanwhile the middle-class and associated consumption is also rising. Also among high-income classes there is a culture in which consumption is glorified, which explains why they are per capita the greatest contributors to global consumption. Our increase in global consumption is having a negative effect on natural resources. Much has already been done to reduce Greenhouse Gas Emissions by improving building energy efficiency. But in the sustainability discussion concerning buildings the dialogue is often only about energy, while it should include other social, economic and other environmental factors as well. A paradigm shift is taking place where people value sustainability more and there is an increasing awareness of the limits of the planet's resources.

A problem with sustainable building is that it can require more knowledge, time and/or costs. The positive effects of building sustainably are sometimes indirect or only visible over a longer period of time. First BREEAM was developed in 1990 in the UK. In 2000 LEED (Leadership in Energy & Environmental Design) was derived from this system in the US by the United States Green Building Council (USGBC) (Techniplan, 2016).

The purpose of LEED is to promote sustainable development and quantify the additional value of the building in a larger context. Also the building parties can get market recognition for their achievements.

In order to get a LEED certification, the project first needs to be registered, then an application will be done and reviewed by an expert, which can finally lead to certification. LEED will check the building

over a period of at least one year and it only rates completed buildings that comply with national and local laws and regulations.

LEED makes a distinction between primary requirements (in order to be taken into consideration for certification), basic requirements (for testing) and innovation points (accredited on top of basic requirements). In the category Building Design + Construction the aspects as mentioned in Figure 1 will be credited.



Figure 1: Credit categories for LEED

Location and transportation (16%)

This category is focused on compact development, transportation and connectedness to facilities such as restaurants and parks. It mainly concerns how the surrounding area influences the behavior of the user.

Sustainable sites (10%)

This category concerns the environment around the building and promotes interaction between buildings and preserving its ecological environment and biodiversity.

Water efficiency (11%)

Looks at all aspects of water use indoor and outdoor. It promotes efficiency and creative use of available water resources.

Energy and atmosphere (33%)

This category promotes the efficient use of energy, energy reduction and the use of renewable energy source.

Materials and resources (13%)

The goal of this category is to minimize the embodied energy in the design and other aspects that are relevant in the production and use of materials such as processing, transport, maintenance and reuse. A life-cycle material approach is used.

Indoor environmental quality (16%)

This category focuses on the air quality and thermal, visual and acoustic comfort. A good indoor environmental quality promotes healthy living so essential in a sustainable design.

Innovation (6%)

The implementation of new technologies is encouraged by additional points that can be scored with innovation. The use of innovative features can be useful for research.

Regional priority (4%)

In every area there are different issues to be solved which have been decided by the USGBC. Extra credits are rewarded if the design is in line with solving the local issues.

Integrative process (1%)

The integrative process differs from other credit categories because it is not setup like a checklist. It just takes the overall integration of the process into account.

Based on the criteria above a certificate on four levels can be awarded. LEED Certified (40-49 points), LEED Silver (50-59 points), LEED Gold (60-79 points) or LEED Platinum (more than 80 points).

3 IN WHAT CASES TO USE LEED?

LEED is originally developed for the American market and one might argue that BREEAM is a more suitable candidate for buildings in Europe. However BREEAM is still only the biggest in the UK and LEED is being used more worldwide especially in emerging markets. Ever since BRE has been privatized they have been accused of unnecessarily increasing prices.

4 HOW TO IMPLEMENT LEED: CASE STUDIES

5 GREEN WASHING OR SUSTAINABLE: SOME CRITICAL NOTES

The environmental advantages of LEED certification are obvious. But aside from that LEED-certified buildings also cost less to operate and are of high quality for the users. Governmental incentives can also make LEED buildings a better investment. They will have lower utility bills and provide a healthy environment for occupants (Fuerst, 2011).

Healthier, more productive places, reduce stress on the environment by encouraging energy efficiency and resource efficiency. Also savings are made from increased building value, higher lease rates and decreased utility costs.

One of the often mentioned critical notes on LEED is that it is just a number but does not directly mean that a building is sustainable. It just means that a building is sustainable according to that ranking system.

Also companies are often fighting to get the highest LEED score, which might make them overlook other factors which are not in the ranking systems. It might make them hide factors just in order to get a good score.

Some new buildings are rated LEED, but older buildings are always way more sustainable than building something new.

Another disadvantage is that the ranking systems are costly. The designer could also take all of the environmental aspects into account without going through the trouble of getting everything approved by the USGBC.

6 CONCLUSION

In conclusion LEED can be a useful tool to integrate several environmental factors into the design and construction process. But the certification only gives a picture of that moment and not about how the building performs in the long run. It is also possible to reach the same goals without using this sustainability certification system.

REFERENCES

- Appelbaum, A. (2010, May 19). *Don't LEED Us Astray*. Opgehaald van The New York Times:
<http://www.nytimes.com/2010/05/20/opinion/20Appelbaum.html?scp=1&sq=don%E2%80%99t%20LEED%20us%20astray&scse>
- Fuerst, F. (2011). Green Noise or Green Value? Measuring the Effects of Environmental Certification on Office Values. *Real Estate Economics*, 45-69.
- Techniplan. (2016, October 11). *LEED*. Opgehaald van Kies Uw Label: www.kiesuwlabel.nl/leed
- UNEP. (2016, October 11). *Why Buildings*. Opgehaald van United Nations Environment Programme:
<http://www.unep.org/sbci/AboutSBCI/Background.asp>