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**LEED CERTIFICATION OF MEDINA TOWER
PRE-REQUISITE TO ZERO ENERGY BUILDING?**

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ABSTRACT: The increasing attention to sustainability is pushing the construction sector to build more sustainable buildings. The paper raises the awareness on whether conflicts arise between available rating systems in achieving the overall green building targets and performances.

Keywords: LEED, Zero-Net Energy

1 LEED as a Sustainable Energy Tool

1.1 Sustainability Assessment

The increasing number of certified buildings shows that awareness of sustainability is increasing. Moreover, the assessment scale allowed by many rating systems, which permit definition of several sustainability grades, has shown a trend towards higher sustainability levels in the last few years.

Figure 1 shows which aspects of building performance are given more consideration in sustainability assessments. It groups the criteria of various rating systems namely: SBTool, BREEAM, Green Globes, LEED, CASBEE and ITACA into seven main categories. Selection of these categories was based on main sustainability building aspects (Langston and Ding): site selection, energy efficiency, water efficiency material and resources, indoor environmental quality, waste and pollution. The category ‘others’ contains criteria that do not fit into the other six categories.

It is clearly visible from Figure 1 that energy efficiency amongst assessment systems is always considered the most important category (weight average is 25.5%), followed by IEQ (17.7%), waste and pollution (15.9%), sustainable site (13.2%) and material and resources (11.5%).

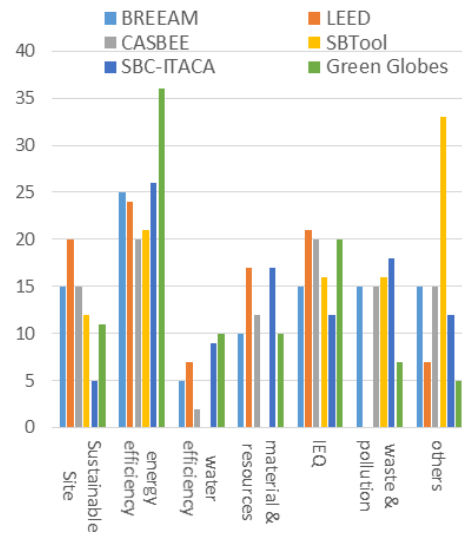


Figure 1 A comparison weighing the categories amongst six sustainable rating systems

1.2 LEED

LEED is the most diffused sustainable energy tool currently available worldwide. It has been chosen to discuss aspects of sustainable buildings by looking at the statistics of achieved points in certified buildings. A sample of 490 buildings was selected in the GBC database, from already built projects. Selected buildings belonged to several typologies, with a large majority of commercial (52%) and residential (30%) buildings. Figure 2 shows points earned on average over the total possible points. The data suggests the following several considerations:

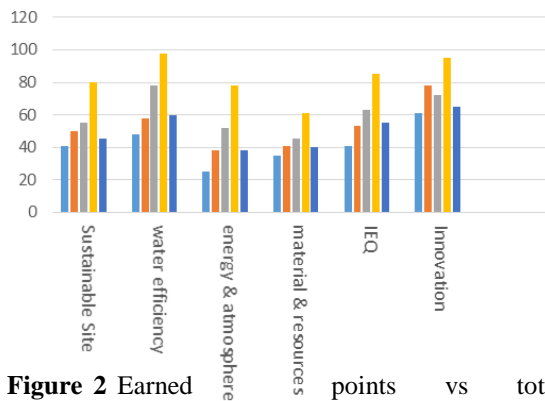


Figure 2 Earned points vs total possible point for different classes of LEED buildings

- ‘Sustainable site’ is an important category in the overall evaluation (14/69 available points); however, assessed buildings reach fewer than 50% of the available points on average. The selection of a sustainable site is often influenced by property possibilities, municipal policies and previous land uses, making a free selection difficult.

- Energy and atmosphere is the category with the largest number of points (17/69 points). The ratio of successful points to possible ones is the lowest among categories (38%).

- Indoor environmental quality is the second category for available points but the first contributing to the total score as average earned points are 56% of available ones.

- Water efficiency receives only a few points in the standard (5/69), despite its importance for a sustainable building. The most probable reason for this is that few actions can lead to a significant efficiency in the use of this resource and, in fact, buildings obtained 62% of the available points on average.

The material and resources category has a considerable number of available points but effectively earned ones are few, with an average of 40%.

The innovation and design process category has a low number of available points, and on average buildings are successful in this category on 66% of the available points, which means that sustainable buildings are generally able to fulfil requirements in this category.

With the largest number of achievable points but third in absolute earned points and last in relative earned points to the total achievable ones, the energy and atmosphere category shows abnormal percentages. This suggests that energy requirements are still difficult to achieve, and also that projects aimed at sustainability certification under-adopt performances within this category. The low result of energy and atmosphere scores can probably be justified by the very low preparedness and the low

awareness of this category among constructors.

1.3 Market Statistics, Climate and Energy targets

Energy related criteria are among the less achieved sustainable categories. In particular, the percentage of buildings with renewable energy production is low for any class of buildings, with only 1% of certified buildings able to produce 20% of energy from renewable sources.

Under the Renewable Energy Directive, Member States have taken on binding national targets for raising the share of renewable energy in their energy consumption by 2020. These targets, which reflect Member States’ different starting points and potential for increasing renewables production, range from 10% in Malta to 49% in Sweden. Clearly showing that the national building sector has to twofold its efforts within the next 5 years in order to align itself with the 20-20-20 climate and energy targets in place.

2 MEDINA TOWER, TRIPOLI

2.1 Aiming for LEED Gold

The Project consists of a 42 storey tower in the heart of Tripoli, Libya. The Client sought to prove their commitment towards a more sustainable future by ensuring this Project attains LEED Gold accreditation. The client appointed at the very early stages of the Project a LEED accredited professional (AP) in order to guide the Project team into working towards a split design and construction review.

During the pre-contract stage a shift in the rating system from a LEED for New Construction to LEED for Core & Shell development took place as the percentage of areas which were designed to S&C finish exceeded the percentage of areas designed to be finished, leaving less room for continuity in uncontrolled areas.

The design team, architects, planners, engineers and client representatives alike worked as an integrated team to coordinate the services to obtain the compulsory prerequisites and credits. Measures were taken to apply actions to each of the consultants and monitor the designs of each respective service, to ensure the maximum number of credits was obtained.

The team took into consideration the use of certain construction materials/methodologies that ensured continuance to achieving LEED Gold or higher namely: contractor to implement an erosion and sedimentation control plan before performing any work on site, applying a ride share proximity scheme and implementation of a grey water scheme. The Project achieved Design Pre-certification status in 2013 with a total of 67 out of 110 available points.

3 ZERO NET ENERGY BUILDINGS

To achieve 'zero' goals including zero energy, it is more often than not, necessary to harvest free energy and renewable resources from the Project site itself. These buildings produce as much or more energy as they consume each year.

Whilst a great variety of ecological design strategies and concepts need to be adopted into creating the Project, the response to load reduction is a critical energy strategy. Buildings use far more energy over the useful life than the materials to create a building. It is more critical to make the building energy efficient and to reduce the demand to generate what is needed.

Whilst knowing that certain MMC methodologies enhance the work towards a more sustainable future, these in general generate an increase in off-site construction shedding some reservation on whether they actually come at a price to the environment.

It has already been proven through a report issued by Davis Langdon, that there is no significant difference in average costs for green buildings as compared to non-green buildings. However, whether there is a cost to the performance of rating systems, when applying one sustainable assessment tool over another, is questionable.

When compared to the conventional or traditional forms of construction methodologies a building being managed with the above 'next-generation' school of thought would produce buildings with energy efficiencies of 80% and higher. The relationship between onsite and offsite construction tends to change, with an increase in the level of pre-engineering and off site work, potentially allowing build programmes to be compressed by running manufacturing and onsite activities in parallel.

Such construction methodologies are often seen in projects adopting a form of rating system. As such use may lead to reduce the waste generated on site, improve indoor quality and much more. Through such MMC, offsite construction is found to compliment and be of a sustainable nature.

However, up front design and development time tends to increase as one moves towards a more full volumetric approach, and careful planning will be needed to ensure that the expected benefits are capitalised for both the project itself and the project being Green.

3.1 Are Zero-net Energy buildings complementary with other Sustainable measures?

A case study issued by the New Building Institute (NBI) redefined the landscape of top performers in building energy efficiency in the US. Revealing 213 commercial buildings that are building a legacy of an annual footprint of zero operational energy and about half these performer buildings are LEED Gold or Platinum certified buildings.

May the above analogy be adopted for all types of sustainable rating systems or are some systems in conflict with each other? By enhancing a building criteria within one system, would this result in the inability to obtain/achieve a credit when using another system? Meeting the EU 20-20-20 energy and climate targets and others alike, are we restricting ourselves in achieving other criteria's?

Within our local industry there is the need to research the use of the various rating systems available to harvest an informed understanding on what suits best our construction industry in making it more sustainable. By ensuring that, the national targets set on a global scale are aligned with what our local market is dictating.

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