

## Leadership in Energy and Environmental Design

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### Abstract

Leadership in Energy and Environmental Design or "LEED" was designed as a correct strategy in Environmental and Energy Design. It redefines the attitude and suggests us a place to live, work and incentives to refresh our thinking. "LEED" is internationally recognized as a premium brand for the owners, manufacturers and users of buildings, with new methods of designing, construction and operation of the understanding and application of materials along with the nature of the so-called "Green". By placing millions of square feet of space, which have been built or under construction, it is trying to get an appropriate rating in the system and issue a certificate of approval for thousands to hundreds of thousands of square meters of space in the world of LEED every day. It has revolutionized the LEED design, construction and operation of Environment and Natural Resources in homes, buildings and urban spaces and our lives are inclusive and flexible in various stages of designing, construction and operation of a building.

**Key words:** lead, energy, environment,

### Introduction

Green buildings are adapted with environment and conserve the land resources. The wide range of related subjects such as designing, construction, maintenance and demolishing are compatible with environment. Also, architects and engineers in each step of green construction are spending efforts to develop and complete the classic designing in order to provide economic, durable levels and residents live in comfort ( Fig 1). Technologies is constantly developed and expanded to prepare complimentary activities. Green building help build environment and provide safety and health for residents by following approaches:

- The efficient usage of water energy and other resources
- Protect environment and improving the efficiency of users
- Deceasing waste, pollution and demolishing environment

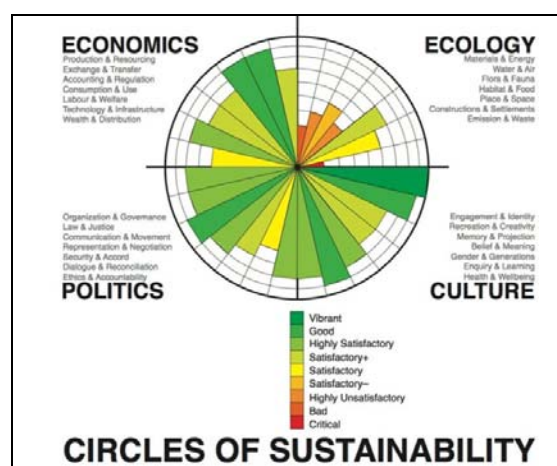


Figure 1: Circles of sustainability

To make a systematic harmony between green buildings and new technology and presenting these to purchaser, an international building certificate named LEED has been planned. LEED is a valid certificate that is based in pointing system for designing and developing residential places and benefit from green building with high efficiency. (Fig 2)



**Figure 2: LEED Core concepts and Strategies Online Course**

This system was established in USA in 1993. At that time, there was only green council but LEED was developed by USGBC (USA's green building council) in March 2006 and familiarize the properties owners with framework that includes development of practical and measurable projects of green buildings and solution for maintenance. Since that time, more than 7000 projects in USA and thirty countries in area estimated 140 square kilometer is covered by this system. LEED promotes green and sustainable buildings. It also develops them by Accredited Professional Program. To achieve this certificate, it must discover solutions for more suitable function towards environment and urban health and put them into practice. This system is based on an open process and mutual satisfaction, conducted by LEED committee; the main elements of these processes include the following:

- Presenting the designing by a specific organization, registered and stable condition
- Reviewing designing by technical and consulting groups that its members are experienced and preside in assessments.
- Providing an opportunity for expressing and sharing ideas

#### ***LEED rating system***

Nowadays, LEED consists of nine rating system for designing, phases efficiency, buildings and complexes. In order to calculate points, each building in LEED falls in five categories as below:

- LEED for new buildings
- LEED for central offices and headquarters
- LEED for schools and educational centers
- LEED for retails and small business places
- LEED for hospitals and health centers
- LEED for retails, business, maintenance
- LEED for existing building
- LEED for neighborhoods, designing and residential places.

**Types of Certificates**

These certificates are generally four different levels, depending on the place of business is issued to the owners and manufacturers (Table 1):

49-40 points: **Authentic certified**

59-50 points: **silver** Score

79-60: **Gold** Rated

80 and older: **Platinum**

**Table 1: Different type of certificate**

LEED Rating	Certified	Silver	Gold	Platinum
Energy Savings	25 to 35%	35 to 50%	50 to 60%	>60%
Annual Utility Savings	\$0.75/ft <sup>2</sup>	\$1.00/ft <sup>2</sup>	\$1.25/ft <sup>2</sup>	\$1.50/ft <sup>2</sup>
Typical Payback	Under 3 yrs	3-5 yrs	5-10 yrs	10+ years
Incremental Construction Cost				
Small Buildings	3%	7%	10%	15%
Large Buildings	1%	3%	5%	8%

Companies that develop new buildings are designed and implemented to get a certificate for each project. Nine different components should be considered , t each of them brings concessions for projects in which the sum of points to be quorum is desired to achieve a certification project.

New buildings	Existing building renovations	Points
10.5%	3.5%	1
14%	7%	2
17.5%	10.5%	3
21%	14%	4
24.5%	17.5%	5
28%	21%	6
31.5%	24.5%	7
35%	28%	8
38.5%	31.5%	9
42%	35%	10

**Figure 3. LEED for new construction**

These components and up to the point of commercial and industrial buildings or construction projects or projects under construction and maintenance of buildings constructed are as follows:

**Sustainable site selection** (maximum 26 points): This component is based on the selection in a way that minimizes damage to the environment, has the negative impact on ecosystems and natural resources, pollutes the water to have. In this ranking, the highest rated sites are developed and sustained close to the public transport network are granted.

**Water efficiency** (maximum 10 points): These components encourage the reduction of water consumption by installing recycling systems and water saving projects.

**Energy and Atmosphere** (maximum 35 points): It is rated for energy efficiency and electricity by monitoring the power consumption of electrical appliances and energy efficient

lighting systems , in which high efficiency are achieved. This component will also promote sustainable energy use and install the driver for these systems, such as solar water heaters.

**Materials, Materials and Resources** (maximum 14 points): These components are used in an effort to minimize waste and left-construction and consumption in office buildings. In connection with the construction of a building, massive amounts of garbage and construction debris produced on site (1). Therefore, these components are used in order to avoid the indiscriminate use and disposal of materials, which are intended to encourage recycling and reuse, and also this is a massive waste.

**Quality indoor** (maximum 15 points): This component encourages higher quality and cleans air inside the building and the use of natural day lighting up inside the building. The goal of masonry construction is higher performance, more comfortable and safer for consumers (Diamond, Opitz, Hicks, Von Neida, Herrera, 2006)

**Innovation in Design** (maximum 6 points)

**local priorities** (maximum 4 points)

### **Strategies and conclusions**

**Target:** Building a LEED housing with 100\$ for each feet square in construction expenses.

**Strategy:** the complexity of housing decreases in order to achieve a modern and spacious house. It should have the maximum usage of space and the minimum energy consumption.

**Conclusion:** The LEED platinum house, around 150.1 feet square was built with less than 100\$. So far, this house can meet our expectations and provide comfort for tenants. (Scofield, 2009).

**Table 2: LEED for residential buildings, Certificate 2010**

Assessment	The maximum point	Acquired point
Innovation in designing	11	7.5
Communication and location	10	10
Sustainable site	18.5	22
Water efficiency	6	15
Energy consumption	28.5	30
Material and resources	6	8
Indoor environmental quality	12	21
Awareness and education	2	3

### **The function of example**

**Site:** 100k is a small house in Philadelphia near subway and bus station. It is believed that reusing of land in compact and crowded area is necessary for sustainable architecture.

### **Energy efficiency**

Applying SIP panel, and advanced technique in air drainage, efficient window frame can help make a developed building. This insulation is a key to energy function and economizing.

### **Different LEED certification**

LEED certifications are available for the following:

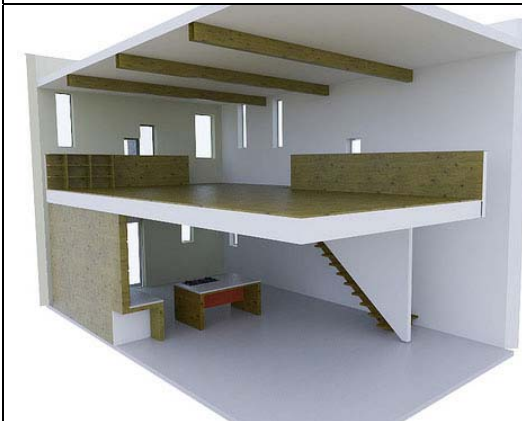
- LEED for existing building
- LEED for projects
- Receiving pre-certificate
- Renewal LEED certificate



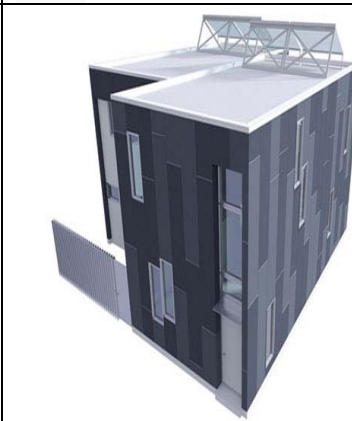
**Figure 4. Innovation in design 11 / 7.5**



**Figure 5. Indoor Environmental Quality 12.21**



**Figure 6. Position and Communication 10/10**



**Figure 7. Materials and Resources 6 / 8.5**

### ***Prerequisite***

As LEED is a certificate for green buildings, the requirements should be prepared in advance. Each building or project should respect the seven following characteristics. (Gifford) *Respecting environmental codes*: As it is expected, this is the minimum feature that should be fully respected. All applicants must comply all environmental codes and regulation related to the building.

1) *Respecting the minimum land occupation*: As it was already mentioned, hospitals and educational places can receive this certificate. These projects have less land occupation over area and in order to receive the certificate, the building part will be considered (Newsham, Mancini, Benjamin, 2009)

2) *Justifying the project scale*: An important question that may occur is that what measure should be taken if owners intend to construct on site as they wish. It is worth mentioning that all projects looking for LEED certificate should justify the allocated budget from the very beginning to the end in a specified area with proper space (Richter, Crabtree, ...)

3) *The minimum density with maximum numbers of buildings*: Also, the building area or project and number of residents with the minimum of density and maximum of residents should be calculated (Lstiburek, 2008).

4) *The minimum of building area*: Regarding the function and building area, site should be selected and calculated minimum.

5) *Building permanency or project*: This rule is applied to most buildings and all projects should be built in an area with determined owner and permanent.

*Correct transferring of energy and water consumption in the building*: It is obligatory and before receiving the LEED certificate, it should be noticed that water and energy consumption are directly inspected by LEED observers in a 5 year basis. The applicant is committed to transfer information correctly and in case of address changing, the new owners should be justified.

### Conclusion

Leading in Energy and Environmental Design System is essential for new structures and it can be applied to the new administrative buildings. Regarding the objectives, the following can be mentioned:

- Providing facilities and amenities in order to meet the residents' health, environment and economy, return and capital costs
- Defining the notion of a "green"
- Avoiding claims null and void in this area
- Improving the quality and coordination of building projects
- Regarding as a standard in force in the design
- Recognizing the pioneering architects
- Green competition among manufacturers
- Establishing an organization for the valuation of buildings for sale
- Promoting public awareness
- Transforming the city's public buildings

Based on the above objectives, a system is provided for the ongoing assessment of buildings in compliance issues, sustainability, conservation, human comfort, protecting the future, having no damage to the environment, and finally controlling urban area of the city known as the Green Belt Privacy dates, etc.. Implementation of such standards in Iran can solve a lot of traffic problems, save urban square and fuel and non-renewable raw materials, control air pollution, minimize construction waste and other environmental issues.

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