

Social and Economic Challenges of Implementing Sustainable Materials on Buildings in Kuwait

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Abstract

Many factors affect attaining the required credits for LEED materials and resources (MR) section. There are disadvantages in obtaining credits and LEED certifying an existing building in Kuwait to become a sustainable green building. LEED is still relatively new in Kuwait and the Gulf region, therefore, when certifying an existing governmental building, difficulty is faced with obtaining complete building owners, building upper management and occupant cooperation. This raises challenges when requiring cooperation from building occupants and cleaning staff for the solid waste management credits which require dedication to reduce the amount of waste going to landfills and incinerating facilities. The mindset of the contractor and subcontractor has to change to gain full understanding and cooperation in the waste management of construction materials when constructing new buildings and performing facility alterations on site. The selection of sustainable materials is more challenging as many materials are not available in Kuwait and the surrounding Gulf countries. Transportation from abroad should be decreased as much as possible to reduce cost as well as decreasing negative environmental impacts. Green certified materials are more expensive, therefore decision maker have to be willing to pay the extra cost.

This paper discusses the challenges faced by KISR team as a consultancy body to certify an existing building according to LEED rating system from the material and resources aspect. It discusses the acceptance of the building owners, building upper management and the building occupants to this change and their understanding and cooperation. Many materials for MR credits 2 and 3 were found difficult to be obtained in Kuwait and the surrounding gulf region. Some materials were found to be available in the

Gulf region. Each credit will be examined, the challenges KISR staff faced and the means they were overcome.

Keywords:

credits, environmental impacts, existing building, facility alterations, incinerating facilities, LEED, material and resources (MR), solid waste, sustainable.

Introduction

The LEED green building rating system, which stands for Leadership in Energy and Environmental Design, was established in 1998 by the US Green Building Council (USGBC). LEED was designed to promote design and construction practices that reduce energy consumption, gas emissions and improve occupant health. USGBC administers the development and ongoing improvement of the LEED rating systems and is also the primary source for LEED and green building education and resources for project teams. USGBC's mission is to promote the design and construction of buildings that are environmentally responsible, profitable and healthy places to live and work. The Green Building Certification Institute, (GBCI), which was established in 2008, administers and awards LEED certification to all commercial and industrial projects registered under any LEED Rating System. The report "Green Building by the Numbers", published in April 2009 by USGBC "states there are 2,476 LEED certified projects and 19,524 registered projects, distributed in over 90 countries." Altogether, commercial building space with LEED certification amounts to more than 5 billion square feet. LEED is a relatively new practice in Kuwait and has only been adopted during the past couple of years, therefore implementing LEED on new and existing buildings is extremely challenging. In this paper we will discuss the challenges faced by the project team, and how they were overcome while implementing LEED Existing Building Operations and Maintenance (EB O&M), Material and Resources credits on an existing building in Kuwait. Building owners and decision makers in Kuwait have to understand the advantages of adopting LEED. A green building will reduce the negative environmental impacts of different materials brought into the project building. LEED will also reduce the impacts of consumption of electricity and water which will be of a great benefit to Kuwait as it is

considered one of the highest countries in electrical power and water consumption. The peak electrical load reached in 2012 was 11,850MW and according to 2011 statistics each person in Kuwait consumes 600L of water a day. By implementing LEED we hope these figures will significantly decrease. There will be economic benefits from an obvious decrease in operating costs and increased productivity. The community will benefit by minimizing the strain on local infrastructures, hence improving the quality of life. It will enhance occupant comfort and health. Adoption of LEED requirements in office buildings will provide employees with a healthy and comfortable workplace, leading to employee satisfaction. It will improve occupant performance, and in turn will reduce absenteeism and turnover, which will decrease productivity losses per year.

There are different LEED rating systems for different types of buildings. Table. 1 shows the various rating systems and their reference.

Table 1. LEED Rating System.

Rating System	Reference Guide
LEED for New Construction	GREEN BUILDING DESIGN & CONSTRUCTION 2009 Edition
LEED for Core & Shell	
LEED for Schools	
LEED for Healthcare	
LEED for Retail	
LEED for Commercial Interiors	GREEN INTERIOR DESIGN & CONSTRUCTION, 2009 Edition
LEED for Retail Interiors	
LEED for Existing Buildings	GREEN BUILDING OPERATIONS & MAINTANANCE, 2009 Edition
LEED for Existing Schools	

LEED Existing Building Operation and Maintenance Rating System

LEED for Existing Building Operation & Maintenance (EB O&M) rating system helps building owners and operators measure operations, improvements and maintenance on a consistent scale, with the goal of maximizing operational efficiency while minimizing environmental impacts. It addresses whole-building cleaning and maintenance issues, including chemical use, recycling programs, exterior maintenance programs, and systems upgrades. LEED EB O&M certification is granted by GBCI for projects when sufficient documentation proves compliance with the required number of prerequisites and optional credits. LEED EB O&M will transform the way buildings are operated enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life. It aims to minimize the landfill and disposal of different materials brought out of the project building and to greatly reduce operating costs. LEED EB O&M will transform the way buildings are operated enabling an environmentally and socially responsible, healthy and prosperous environment that improves the quality of life.

There is currently no LEED EB O&M certified building in Kuwait however there are two LEED EB O&M registered buildings. There is one LEED EB O&M certified building in Dubai, the Dubai Chamber of Commerce and Industry which is also the only one in the Arab World. Based on 2010/2011 studies, outside of the USA there are only 12 LEED EB O&M certified buildings.

To gain certification, points must be earned. There are Minimum Project Requirements (MPR) and prerequisites, which are mandatory requirements and vary according to each rating system. These must be met in order for the project to achieve LEED certification. Then there are selective credits, which are non-mandatory and comprise of points. These credits are chosen by the project team according to their preference to achieve score points. A minimum of 40 points should be earned to gain certification.

The Minimum Project Requirement for LEED EB O&M is the same for every LEED rating system and is as follows:

1. The project must comply with environmental laws.

2. The project must be a complete, permanent building or space.
3. It must use a reasonable boundary.
4. The project must comply with minimum floor area requirements (93 m² gross floor area).
5. It must comply with minimum occupancy rates where Full Time Equivalent occupancy (FTE): one or more FTE and Minimum Occupancy Rate is twelve consecutive months.
6. The project must commit to sharing whole-building water and energy usage data.
7. It must comply with a minimum building area to site ratio (no less than 2%).

EB O&M certification is granted by the GBCI for projects when sufficient documentation proves compliance with the required number of prerequisites and optional credits that are distributed between seven categories; Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, Innovation in Operation, Regional Priority. Certification is awarded based on the number of points earned.

EB O&M Materials and Resources Credits (MR)

The intent of this Credit as stated in LEED 2009 for Existing Buildings Operations and Maintenance is "to reduce the environmental and air quality impacts of the materials acquired for use in the operations maintenance of buildings". Its goal is to reduce the negative environmental impacts of different materials brought into the building and to minimize the landfill and disposal of different materials brought out of the building. Adopting a sustainable building will reduce waste by managing waste solids, it will focus on reusing and recycling materials whenever possible. Mercury pollution generated in the building will also be reduced. Adopting a purchasing program of green sustainable materials as well as managing waste solids can achieve these objectives. Material and Resources credits are described below:

- MR Prerequisite 1: Sustainable Purchasing Policy (Required)
- MR Prerequisite 2: Solid Waste Management Policy (Required)
- MR Credit 1: Sustainable Purchasing- Ongoing Consumables
- MR Credit 2: Sustainable Purchasing-Durable Goods

- MR Credit 3: Sustainable Purchasing-Faculty Alterations and Additions
- MR Credit 4: Sustainable Purchasing-Reduced Mercury in Lamps
- MR Credit 5: Sustainable Purchasing-Food
- MR Credit 6: Solid Waste Management-Waste Stream Audit
- MR Credit 7: Solid Waste Management- Ongoing Consumables
- MR Credit 8: Solid Waste Management-Durable Goods
- MR Credit 9:Solid Waste Management-Facility Alterations and Additions

This paper is mainly about the obstacles and challenges faced economically and socially during the implementation period for different credits within the materials and resources category for an existing building in Kuwait. The first section discusses obstacles and difficulties faced in Kuwait with regard to sustainable purchases, while the second section discusses the challenges related to waste management.

Section 1: Sustainable Purchasing

This section will discuss the material and resources prerequisites and credits for LEED EB O&M and how they were tackled and overcome by the project team.

When purchasing sustainable environmental friendly products, the following issues have to be considered:

1. There should be a reduction in the use of resources.
2. There should be a reduction and prevention in waste produced.
3. Occupant's health and safety should be taken into consideration.
4. The growth of a sustainable economy.
5. Pollution and toxin reduction.
6. A reduction of greenhouse gas emissions.

Sustainability requirements for some of the MR credits were found to be applicable in Kuwait, on the other hand, challenges were faced when applying sustainable measures to some of the MR credits. The difficulties faced can be generally described as :

- Limited choices of sustainable materials in the local market.
- Limited number of vendors locally or in the Gulf region.
- Lack of cooperation with vendors .

- High cost of available sustainable materials in the local market.

To certify an existing building as a green building according to LEED requirements, at least 60% of the purchases of ongoing consumables (MRC1) should fall within the sustainability criteria specified below:

- Materials harvested and processed or extracted and processed within (800 KM) of the project.
- FSC certified paper
- Rapidly renewable materials such as bamboo, cotton, cork and wool.
- Rechargeable Batteries.
- Post-consumer materials and/or post-industrial materials.

The challenges faced while implementing this credit in Kuwait is that there is a limited availability (if any) of locally produced sustainable ongoing consumables. FSC paper is very difficult to find and if available is extremely expensive compared to the price of regular paper. Building owners or decision maker for office buildings still do not comprehend the importance of purchasing FSC paper. They also are still not aware of the significance of purchasing other sustainable materials at more expensive prices when to them; the same material is available for a less price. There are a limited number of vendors supplying sustainable consumable goods in the local market. It is possible to obtain materials containing pre or post consumer materials, but they do not contain the percentages specified by LEED. There is a lack of cooperation with some potential suppliers of sustainable consumable goods. As for MRC2, at least 40% of the purchased durable goods (electrical equipment and furniture) should be sustainable. The sustainable criteria for electrical equipment is energy star. Although energy star qualified equipment is widely available in the Kuwaiti market, they are not always used or purchased as they are much more expensive and to the building owners point of view are not attractive cost wise as electrical equipment with the same use and are not energy star qualified. This issue should be clearly clarified to building owners. Challenges are faced when employees are encouraged to minimize the number of printers and copiers in a building, and to share these machines, in order to reduce VOCs and provide a healthy working environment. There is not enough cooperation from the employees to perform this step as

it requires changes in their regular daily routine which they are not inclined to take as they do not fully understand its benefits.

When furniture is to be purchased, the following criteria should be applied for at least 40% of the purchased goods:

- Materials harvested and processed or extracted and processed within (800 KM) of the project.
- FSC certified wood.
- Rapidly renewable material.
- Material salvaged from off-site or on-site.
- Post-consumer materials and/or post-industrial materials.

There are very few vendors that supply sustainable furniture in Kuwait therefore the designs and colors are very limited. There has to be a large order for sustainable furniture to make it worthwhile cost wise to order it from reliable vendors located abroad, however LEED encourages the use of local producers to decrease transportation costs and to reduce pollution from planes, ships and other transport vehicles that may be used to transport the furniture to Kuwait. Sustainable furniture is much more expensive than other furniture of which there is a wide variety of designs, material and colors, therefore building owner and decision makers have to be completely aware and dedicated to the purchasing of sustainable furniture.

Any alterations and additions for the building should satisfy LEED requirements for this credit (MRC 3) by at least 50% as follow:

1. Green seal's standard GS-11 requirements for paints and coatings
2. Non carpet finished flooring are Floor Score-certified.
3. The carpets meets the requirements of the CRI Green Label Plus Testing Program.
4. Carpet cushion meets the requirements of the CRI Green Label testing Program.
5. Adhesives and sealants should have a VOC content less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule # 1168, or sealants used as fillers must meet or exceed the requirements of the Bay Area Quality Management District Regulation 8, Rule 51.

6. Composite panels and agrifiber products should not contain any added urea-formaldehyde resins.
7. Forest Stewardship Council (FSC) certified wood.
8. Rapid renewable materials.

The selected materials should decrease the emission of harmful gases, volatile organic compounds (VOCs) to the environment, and therefore improve the general quality of surrounding air. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. The adverse health effects of VOC exposure are they can cause eye, nose, throat irritations, headaches, loss of coordination, nausea, and damage to liver, kidney, and to the central nervous system. Some VOCs are suspected or known to cause cancer in humans. Key signs or symptoms associated with exposure to VOCs include:

- Conjunctival irritation (pinkeye)
- Nose and throat discomfort
- Headache
- Allergic skin reaction
- Nausea
- Fatigue
- Dizziness
- Shortness of breath which may lead to asthma & cardiac disorders

Psychologically, staff will not be comfortable working in an environment that may cause any of these symptoms and productivity will be low.

Kuwait is a relative new market for LEED certified materials, therefore difficulty is faced locating LEED materials required for this credit available locally and when found they will be more expensive therefore difficulty is faced is persuading upper management to purchase the material. Many LEED certified materials do not have a local supplier and problems are faced with upper management acceptance when requesting items with no locally supplier. Specifications for this credit are very difficult to find in the local market, at best can be found in the surrounding Middle Eastern countries or imported from abroad.

As mentioned earlier in LEED specifications, materials salvaged off-site, or materials salvaged on-site and refurbished building materials and products such as beams and posts, wood flooring and paneling, doors and frames, cabinetry and furniture, brick and other masonry products, hardware and lighting can be used for the building alterations and additions. To Kuwait this is a very new concept to use salvaged and refurbished materials for a new addition to any building and it is not easily accepted by building owners. The requirement that would be easiest to accomplish would be purchases harvested and processed or extracted and processed within 500 miles which can be purchases from the surrounding Middle East countries.

Maintaining a sustainable food purchasing program that satisfies purchasing of at least 25% of total combined food and beverage purchases (by cost) during the projects performance period of a project is essential to earn the point associated with this credit (MRC5), however, It is tough to obtain in Kuwait local market foods and beverages that bear the following food certifications required by LEED and if found they would be very expensive:

- United States Department of Agriculture (USDA) Organic
- Food Alliance Certified
- Rainforest Alliance Certified
- Protected Harvest Certified
- Fair Trade
- Marine Stewardship Council's Blue Eco- Label

To overcome this obstacle, 25% of food and beverages purchases by cost were selected from factories that are within 100 miles radius from the building location.

Section 2: Waste Management

Different types of waste recycling programs can be performed for an existing building during the building performance period, including recycling of consumables, durable goods which has a longer service life than the ongoing consumables and recycling of any construction waste generated after any renovation or construction work in the building. LEED encourages reuse and recycling of consumable materials when

possible in order to reduce the landfill and protect the environment and public health, conserve natural resources, and reduce toxicity. This requires performing a waste stream audit for the waste generated from the building and according to the output of this audit a recycle and reuse program can be adopted. To successfully implement these credits (MRC6 and MRC7) in Kuwait, there should be complete cooperation and commitment from building owners, occupants and staff to the correct disposal of waste. They should be completely committed to recycle waste for the long term and not just for a short period of time while it is a novel and new idea to them. The recycling rate is derived by comparing the amount of consumables diverted from the landfill to those consumables sent to the landfill over a given time period. The building occupants have to reach this goal and recycling is still a new concept in Kuwait that many people are still not committed to. It is also difficult to locate local companies that will recycle or dispose of waste in a responsible manner.

In performing this task, the following challenges were faced:

- Lack of awareness and cooperation from housekeeping staff and building occupants with the audit team which requires sorting of the generated waste during the whole time of the audit period.
- Lack of commitment of the recycling party with audit team.
- No availability of a batteries recycling program.
- Lack of cooperation from building occupants in sorting wastes and dropping waste at the specified waste container.
- Lack of commitment from cleaning staff to transfer waste continuously from collection points in the building to the recycling area.

This task requires acceptance of building occupants to minimize waste as possible, as well as work or use recycled materials. In addition, regular continuous monitoring of the solid waste stream recycling program is required.

Another recycling program has to be adopted for durable goods in order to reduce waste from building occupants going to landfills or incinerators. A waste reduction and recycling program for durable goods that are replaced infrequently such as computers, monitors, copiers, printers, scanners and televisions should be established. 75% of the durable goods waste stream by weight, volume or replacement value during the

performance period of a project should be reused or recycled. In Kuwait recycling is usually measured by volume. These items include:

- Office electronic equipment.
- Appliances.
- Power adapters
- Televisions and audiovisual equipment.

Durable goods should be separated from ongoing consumables. Bins designated for durable goods must be established and signs should identify the types of waste allowed. The amount of durable goods intended for landfills should be reduced. A formal reuse program for furniture and electronics has to be established. The reuse program can be achieved effortlessly in Kuwait by donating furniture and electronics to countless charities in the country, but it may be challenging to make the program formal where all the occupants dispose of their furniture and goods in one place and it will be sorted out by committed staff and donated to charities. Difficulty will also be faced in gaining cooperation from occupants, staff and janitors to dispose of durable goods in the correct allocated waste bins and to commit to it in the long run. It will be also challenging to establish a method to track and calculate all landfilled and diverted durable goods as required by LEED.

Construction and demolition waste needs to be recycled by keeping it out of landfills and reusing appropriate materials.

It will be challenging to create and use a waste management strategy for construction materials. Qualifying materials include those that are removed and reused. Cooperation from contractors is required as they should be willing to design with standard-sized materials and avoid waste from cutting materials to odd sizes. They should consider using bolts in place of glue, be willing to minimize waste on the site, such as by over packing and create a tracking program for all waste to ensure uncontrolled waste is not leaving the job site. Contractors and subcontractors should be oriented at the start of construction on how to manage waste, to control it and how to track all applicable waste materials generated and diverted. A quality-control program should be implemented to ensure diversion targets are being met. The contractor should designate recycling areas on the job site and make sure workers are aware of them and their functions. Usually

uneducated workers are constructing on the site, therefore it will not be easy to get them to place the waste to be recycled in their designated bins. To achieve these goals, gaining complete cooperation from contractors is obligatory. The contractors have to be educated to want to enforce LEED and insist that all the laborers and construction staff on site perform the LEED requirements. It is also essential to find and work with a reliable waste hauler who will establish a system to manage and track construction waste, which is also not easy as there are very few dependable waste haulers in Kuwait. In addition, any generated construction waste is not easily transferred to be used in a different site by recycling companies here in Kuwait, as most of the recycling companies currently deal with specific types of waste such as paper, plastic and metal and have no interest in using construction waste. Only limited number of recycling companies in Kuwait deal with such type of waste, and only with large quantities.

Conclusion

For LEED to be implemented successfully in Kuwait, there has to be complete building management and building occupant cooperation. All people involved with the building have to be dedicated to making a change and want to achieve a green building. The general mindset, awareness and dedication of the public should be changed to make more people care about the environment and the future and be more involved. Applying LEED requirements to an existing building in Kuwait is challenging but possible if buildings owners and occupants are willing to cooperate and abandon some of their habits to their daily routine in order to work for a healthier and safer environment.

In Kuwait, the price of electricity is very low as it is subsidized by the government, so the general public and building owners do not really have any incentive to lower their electricity bill which will be one of the perks gained from having a LEED certified building. However, company employers and building owners could provide mandatory workshop to new employees and new building tenants to educate them on the benefits of sustainable practices to their self, their families and the environment. The Kuwaiti government could encourage vendors in the local market to provide good quality environmentally friendly goods that satisfy green building requirements by

providing them with extra privileges and incentives which will ease and smoothen importing of such goods to Kuwait. More attention should be given to the recycling issues in Kuwait by enforcing properties owners to sort the waste, therefore easing the recycling process for both building owners and recycling companies.

The Kuwait Green Building Council was established in March 2012. Their purpose is to encourage sustainable buildings by showing the positive effects on climate protection, resource consumption, health, quality and efficiency, the economy, the labor market and to substantially reduce energy consumption. One of their main objectives is working to ensure green certified materials and products would be readily available in the Kuwaiti market. They are still a relatively new council and are working hard to make changes. They are currently working on making green cleaning products available in the local market. Their vision is to encourage and engage both public and private sectors to adopt sustainable measures in the development sector in Kuwait. Hopefully they will be able to accomplish their goal and LEED will be easier to achieve in the near future in Kuwait.

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