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Worth of Sick Building Syndrome and Enhance the Quality of Life in Green Building

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***Abstract*—**A proper house is a suitable residential area which provides comfort, proper accessibility, security, stability and permanence of structure, enough lighting, proper initial infrastructures and ventilation for its inhabitants and the most important of all, it should be proportional to the family's financial power .

Saving energy and making optimal usage of it and also taking advantage of stable energies are the bases of green buildings. Making green building will help the health of a person living in it and in its surrounding. It will support the people and provoke their satisfaction. Not only it will bring about the raise of level of the quality of life for building inhabitants, but it will cause the promotion of quality level of life of the people living in the surrounding area and in general the society.

***Keywords*—**Quality of Life, Green Building, environment pollution, Sick Building.

I. Introduction

NOWADAYS, people in rural area spend 80-90 percent of their time inside buildings while they are busy doing different activities [1], [2]. Considering the increase of buildings' density, the usage of different materials in construction and decoration of today's buildings, and the increase of air contamination in urban areas, pollution inside buildings is getting more and more and their inhabitants are more affected, the result of which is dissatisfaction with and complaining about bad air quality in work place and house and consequently it has lead to the emergence of a phenomenon called "Sick Building Syndrome". This has resulted in occurrence of some clinical symptoms including irritation of mucous membrane, dyspnea, cold, allergy, sleepiness, frequent headaches, eye irritation and tearing, sniff, frequent sneezes, dryness of throat, and in some cases asthma. In studies conducted during recent years, the reasons of sick building syndrome and some type of mycoses have been related to each other [3].

The weather inside buildings should always have good quality and capacity of the air which enters the building through air conditioner to replace the existing air should be exactly controlled and free of any pollution. On the other hand, since our energy resources are limited, it is necessary to try to save it. Air conditioning systems should be designed and used in a way that they provide the best air quality in the building with minimum energy consumption. In 1985, the Environmental Protection Agency (EPA) reported that the amount of poisonous materials existing in each American's house may cause cancers three times as much as the polluted air outside the house. Hygienic perils in such houses have been known as "Sick Building Syndrome". It has been estimated that one fifth to one third of American buildings are included in this category at the present.

The issue of permanent development has two major areas:

- Resources not renewable in the world
- Earth and environment pollution

Cities expressed the best samples of stability. Considering ecologic limitations of the region such as: water, proper development compatible with nature, saving of resources, using of indigenous materials, innovation of effective and proper methods for life maintenance such as aqueduct, wind catcher and artful use of water and plant aiming at freshening the air and providing pleasant sceneries, also making orchards and gardens in yards, public places and suburbs, all are samples of effectives factors in this stability.

Green building is often interpreted as a building, the negative effects of which on its environment are less. The purpose of establishing green buildings based on the aforementioned principles is to improve climate and prevent negative effects of development on environment.

II. Methods

Rich countries now go to get green, but for the economy of the poor countries the economic growth will emerge pollution. However regulations of green buildings restrict economic growth.

However the improvement of energy conditions, simultaneously for rich and poor countries is very challengeable. Although considering today's economic conditions, this matter is problematic to all countries. There are many plans to help poor countries, but their fulfillment is difficult. Plans for rural energy, insular countries, world bank budget and etc… are all opportunities to help poor countries to change. The advantage of a country as being a third world in comparison with developed countries is that developed countries has to change and improve what they already have, while the third world countries can make their buildings and power plants in the proper method newly suggested. There are so many problems on the way of making green buildings and green city which are more prominent in developing societies. However in this article it has been attempted to study the advantages of making green buildings on the life of human

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societies and its role in improving the quality level of life.

III. Green Building & Air Pollution Inside the Building

Every year 3 million people die due to air pollution [4], [5], 90% of which are from developed countries. In some countries the number of people who lose their lives due to this factor, is more than the victims of car accidents. This mortality is especially related to asthma, bronchitis, dyspnea, heart attacks and different pulmonary allergies.

IV. Inside Air Quality (IAQ)

Formaldehyde gas rising from construction materials such as moquette, chip board, colors and thinners which cause rising of exposable organic compounds, other pollutants such as fresheners, firing wood in fireplace cause the increase of a great deal of particles in the air. Death due to carbon monoxide usually occurs because of improper chimney of fireplaces or firing coal in interior areas. Small insects in the beds, carpets, moquettes and furniture produce enzymes and excrement in a microbial size. Molds are grown inside walls and produce myctoxins.

V. Green Buildings & Greenhouse Gases

Most hydrocarbons produced from fossil fuels which are made from factories and automobile smoke when being adjacent to UV ray act as accelerator of ozone degradation reaction after reaching ozone layer. Carbon dioxide has the major portion (60%) of earth climate cycle destruction and its production is increasingly continued [6].

Carbon dioxide (CO_2) is the main greenhouse gas which is produced by human. This gas is the result of so many activities made by human and other creatures and is produced daily in a great deal. A 1000 MW power plant by firing liquid in oxidation process enters to the environment and atmosphere in average 15 tons of carbon dioxide gas (CO_2) per hour, equal to 2.2 tons of nitrogen oxides (NOX) and about 105kg. of chard hydrocarbons and other pollutants. The studies conducted on the counties of Organization for Economic Cooperation & Development (OECD) indicates that 40% to 50% of sulphur oxides, 25% of nitrogen oxides and more than 50% of greenhouse gases especially CO_2 are the portion of steam power plants which consumes about 30% of the total energy of the world. It is while that the electricity consumption has been reduced to 50% and is saved in green building and it could have a remarkable role in decreasing greenhouse gases.

VI. Saving Gas in Cold Regions, and Sick Building Syndrome

It has been tried to reduce CO_2 production and fossil fuel burning which is its major human recourse in the nature. Any efforts made by authorities and people in order to reduce fuel consumption in home and trade centers for transportation, industrial and other purposes, is considered as a step towards restoration of environmental health. As a result, in cold regions most efforts have been made to construct buildings in which there is no way of penetration of air and therefore the loss of heat and cold is little. In fact, trying to save energy has led to getting inclined to prevent the air from going in and out of buildings.

On the other hand, decrease of air entrance into buildings bring about decrease of buildings efficiency in meeting ventilation needs of inhabitants, so that the final result of this has been the accumulation of pollutants and as a result occurrence of diseases. In undeveloped and developing countries the number of building without ventilation system in cold seasons is relatively high, and since the cold season is long in cold regions (for 7 months a year) and no natural ventilation is used there, inhabitants of such buildings are exposed to air pollutions inside their house.

VII. Children & Sick Buildings

One of the difficulties of the recent century has been air pollution and increment of the rate of air pollutants. The effects of air pollution in children in comparison with adults is evident to everybody, and the reason is that 80% of postnatal alveoli of children are developed in 6-8 years old [7], [8]. Since children have more physical activities than adults and higher speed of respiration in a minute in comparison with adults, more toxic materials enter their body [9]. In 1971, six major air pollutants which are accordingly Ozone, suspension materials, sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and 189 hazardous air pollutants were recorded [10]. These pollutants cause diseases including chronic vomiting, cancer, infectious, neurologic and respiratory diseases. Since children live in closed environments such as houses and schools, the internal air pollution is very dangerous. In cold countries heating systems and in hot countries cooling systems are one of the major air pollutants in closed spaces. Therefore, pollutants found in closed environments are not found in open spaces. From among other pollutants we can mention the smoke produced while cooking food, construction materials used in modern buildings, insulators, isolations, furniture paints, detergents, cosmetics, insecticides, domestic animals, and air conditioner systems. Air conditioning systems place biologic products such as mycoses, bacteria, and molds inside them and scatter dusts of mineral fibers in the closed environment. Besides, one of the other major problems and things that threaten health is using tobacco products in closed environments [11].

Considering children's sensitivity to environmental factors and the care for their health, enough attention should be paid to their living environment and activity, and it calls for consulting with a health consultant and study the immunity of the house before deciding to live in it.

VIII. Green Building & Natural Light Outlet

Natural light which bears internal vitalizing energy is considered as one of the living resources in the earth. Moreover the light can change the visage of an area by its different colors and effects, because light has a peculiar view

in each season of year, in different climates or at any time during a day.

In green building, building orientation has been considered based on the optimal direction of sun shine aiming at getting the maximum benefit of natural light and getting free energy (for example, equipping the building with solar geyser and optic electrical generator). However what is significant in such building is to provide a way and solution for entering nature to the building which can be fulfilled by making shears in dimensions and filling it with green area. For example by making the main outer wall from glass in green building maximum natural light is absorbed and by using automatic system of light regulating, the light is completed. Using energy saving lamps will save up electrical power up to 80% in comparison with standard incandescent bulbs. Combining these factors increases the general efficiency of the building which leads to saving 60% of energy as compared to similar office buildings.

IX. Conclusion

Green architecture is in fact not a new trend. Since, it was fundamentally seen in so many ancient civilizations and traditional architectures. Today, following negative consequences of industrial world, such as increasing environment and air pollution, decrease of natural resources and energy crisis, protection and safe guarding natural resources of the world has become as one of the major concerns of human in the present time. Green architecture with the target of seeking a solution for minimizing negative effects of buildings on environment is in fact an attempt for having harmony with nature through increasing efficiency and optimizing the consumption of materials, energy and expanding area.

Today, quality of houses as well as new and old residential areas has a sharp drop in developing countries, and environmental pollutions including air and sound pollution, improper management of rubbish and wastes, and harmful effects of chemicals imperils the inhabitants' lives. The existence of sick buildings especially in working and administrative environments is a prevalent and well-known phenomenon.

Besides designing issues for physical comfort such as temperature, humidity, ventilation, sunlight, and the like which should be observed, pollutant resources of urban areas such as sound pollution, factories' pollutants, carbon monoxide and dioxide and lead produced by automobiles may enter buildings and houses as well. But, especial building sickness occurs when an acute or chronic accumulation of pollutants occurs in any types of buildings including residential ones.

According to the mentioned facts, proper design of building and house according to criteria of humans' physical comfort and frequent ventilation of the building's air, decrease of pollutants such as toxic gases, allergens, vapors, and dusts through methods of promoting building condition, replacing old installations and pollutant building components with safe and sound installations may decrease the occurrence of sick building syndromes. Besides, benefiting direct sunlight in a building or house, especially in daily living environments can help the building health. In developing societies besides the fact that the regulations of green buildings should be observed in newly constructed buildings or in those in the process of construction, old buildings in which people are living should be examined and reconstructed based on the regulations of green building.

Thus in green architecture instead of being enemy of nature, its energies are controlled and are used in buildings in the best form. Making green building will help the health of a person living in it and in its surrounding. It will support the people and provoke their satisfaction. Not only it will bring about the raise of level of the quality of life for building inhabitants, but it will cause the promotion of quality level of life of the people living in the surrounding area and in general the society.

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