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*Article*

# Energy Efficient Materials for Sustainable Building

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**Abstract:** As the population growth increases day by day building construction is also increasing. Most of the energy is consumed in buildings through various sources. One such source is the electricity. Finally it affects human health as well as wealth in lot of ways. The focus on the present paper is using the energy efficient materials such as solar cells with super capacitors and efficient lighting materials in buildings. So that the approach of the sustainable development in building is attained.

**Keywords:**

building; energy; solar cells; super capacitors and lighting materials.

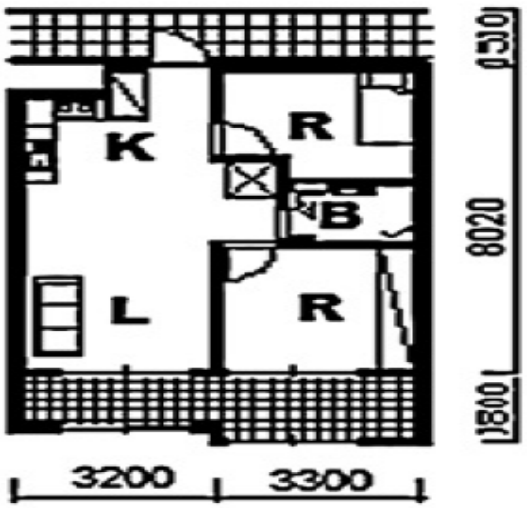
## 1. Introduction

Each and every year constructing new buildings are increasing as the population growth goes up. Buildings consume huge quantity of electricity by the source of thermal power plants which emits heat and toxic gases like $Co_2$. Emission of greenhouse gases and other pollutants are increasing with the increase in demand for electricity. Coal is the main source of energy for obtaining electricity in many countries. Therefore enormous amount of greenhouse gases are emitted through this source. This leads to genetic problems and defects to human health. To reduce these problems and defects, greenhouse gases should be reduced. The efficient use of coal must be reduced for generating electricity instead energy efficient materials such as solar cells, LED and super capacitors should be used. Hence this type of development makes a sustainable approach for generating electricity.

## 2. Experimental Section

In the experimental part, a building model is taken into account. The Usual energy building [UEB] is the usual thermal energy source of building which consumes coal for generating electricity. The Energy efficient building [EEB] is the building which consumes only the energy efficient material such as solar cells, super capacitors and LED lights.

Now compare the UEB with EEB of electricity consumption and $Co_2$ emission in a chart, therefore the energy difference can be found.




This is a 46.2 $m^2$ building which consists of 2BHK [1]. The experimental part is that comparing the amount of electricity consumed in this building per month by UEB and EEB.

## 3. Results and Discussion

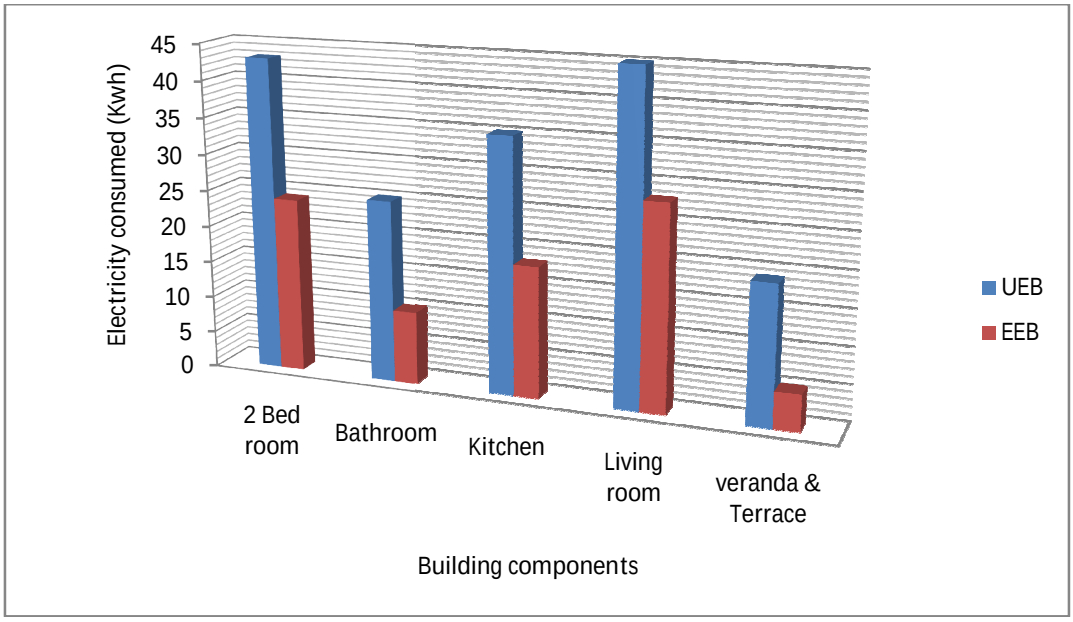
The present paper focuses on the energy efficient materials such as solar cells with super capacitors and efficient lighting materials in buildings with the usual thermal energy building. In this section the result of the experiment is done with the help of a chart for clear identification.

**Table 1.** Components of 46.2 $m^2$ building in UEB & EEB

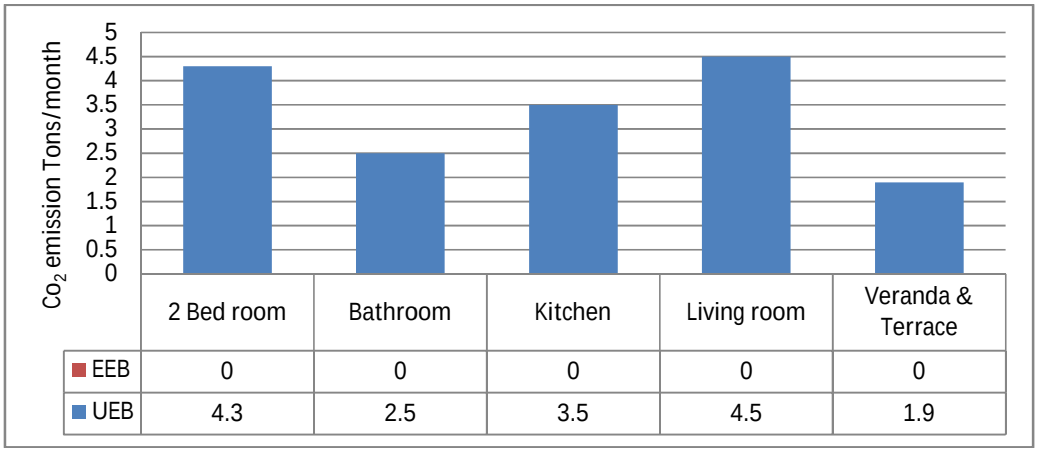
| Description | UEB | EEB |
|---|---|---|
| 2 Bed room (R) | Florescent tube light, AC/fan, computer. | LED lights, AC.fan & computer with super capacitor |
| Bathroom (B) | Florescent lamp, electric water heater. | LED lamp, solar water heater |
| Kitchen (K) | Florescent light, refrigerator, washing machine & stove. | LED light, refrigerator, washing machine with super capacitor & solar stove. |
| Living room (L) | Television, florescent lamp & AC/fan. | LED lights, television & AC/fan with super capacitor. |
| Veranda & Terrace | Florescent tube light and lamp. | LED lamp and lights. |

The above table shows the components of 46.2 $m^2$ building in usual energy building and energy efficient building. The difference between UEB and EEB for the consumption of electricity is found per month of each room of 46.2 $m^2$ building [2].

**Figure 1. (a)** Quantity of Electricity consumed in UEB & EEB of 46.2 $m^2$ building. **(b)** $Co_2$ emission result for UEB & EEB of 46.2 $m^2$ building.




The figure 1 (a) shows that the electricity consumed in UEB is more than the electricity consumed in EEB. This results that the energy efficient materials such as solar cells, super capacitor and LED lights save enormous amount of electricity.




| | 2 Bed room | Bathroom | Kitchen | Living room | Veranda & Terrace |
|---|---|---|---|---|---|
| EEB | 0 | 0 | 0 | 0 | 0 |
| UEB | 4.3 | 2.5 | 3.5 | 4.5 | 1.9 |

The figure 1 (b) shows the $Co_2$ emission in 46.2 $m^2$ building for UEB & EEB. It shows that zero percent emission of $Co_2$ in EEB [3].

## 4. Conclusions

To attain a sustainable development for buildings the energy efficient materials should be used. Therefore every building should use energy efficient materials to reduce the emission of greenhouse gases and defects for human health. The efficient use of coal must be reduced for generating electricity in thermal power plants instead of that energy efficient materials such as solar cells, LED and super capacitors should be used. Hence the conclusion of the present paper shows that the EEB saves electricity and zero percent carbon dioxide emission.

## Acknowledgments

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## Conflicts of Interest

The authors declare no conflict of interest.

## References and Notes

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