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"PASSIVE BUILDING: A REVIEW"

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Abstract –*One of the important issue's today's scientific worlds is the topic of sustainable development and sustainable architecture which is followed. Without doubt, unsustainable consumption of non-renewable natural resources like fossil fuels, the Environment will be at risk in the near future. While the building sector accounts more than a third of energy. Therefore reduce the amount of energy in Buildings causes toward sustainable development which consistent with the needs of today's generation which put future generation at risk. One of the painters of sustainability in architecture is the use of natural energy and fossil energy consumption and minimum natural environmental conditions and climate so solar building designs which is a step towards its achieving. In this project we have expressed the important factors in solar buildings design. These factors are included external factors and internal factors. More owner implementation strategies in the design to same energy in buildings also will be presented.*

Keywords –*Air ventilation, Natural lighting, Thermal comfort, Architectural view, Ecology.*

I. INTRODUCTION

"A Passive House is a building, for which thermal comfort (IDO 7730) can be achieved solely by post heating or post-cooling of the fresh air mass, which is required to achieve sufficient indoor air quality conditions – without the need for additional recirculation of air.
This is a purely functional definition which doesn't contain any numerical values and is valid for all climates. This definition shows that the Passive House is a fundamental concept and not a random standard. Passive Houses have not been "invented" by anyone – in fact, the Passive House principle was discovered. It may be debatable whether the term 'Passive House" accurately describes this concept – well, there is no other term better suited for it. Thermal comfort is achieved to a maximum extent through passive measures (insulation, heat recovery, passive use of solar energy and internal heat sources).

A. Objectives

1. To promote energy efficient building design, i.e. to minimizes energy use and negative environment effect of building.
2. To maximize use of renewable and natural resources in building environment.
3. Building construction with optimum use of solar energy.
4. Thermal comfort for the inhabitants.
5. To reduce maintenance cost.

B. Advantages

1. Mainly it provides perfect temperature and it is renewable energy resource.
2. Its cost of installation is lower than active solar energy resources.
3. It is eco friendly due to the eradication of green house effect.
4. Less or zero usage of conventional equipments.

C. Reason of Passive Building

1. During warm periods, opening your windows is the easiest, cheapest, most effective and environmentally friendly way of cooling your building, with cross ventilation offering the most effective solution; at least in climates, in which the external temperatures cool down during the night. The standard air exchange provided by Passive House ventilation systems generally is far lower, and with the fan giving off additional heat, the cooling effect is reduced even more. The air change rates of ventilation systems are typically laid out for really cold (or hot) periods and may not be too high to keep the air from getting too dry (or too humid). A completely different type of ventilation system would be needed to allow for significantly higher air change rates. Such systems would be more expensive and less efficient; of course, in some circumstances such systems can provide another solution. Providing large volumes of air by opening your windows, on the other hand, is fairly inexpensive.

2. Users typically expect to have openable windows anyway as they offer maximum flexibility. Most users would not want to miss windows as a "connection to the outside world", and want to be able to choose whether to keep the windows open or closed. Eliminating this option might cause discontent amongst users whose wishes should be respected – unless it would be unreasonable to do so (for example in a submarine or a spaceship).

3. Cleaning fixed glazing is usually much more difficult than cleaning windows that can be opened and cleaned from the inside. Openable windows thus make a building much easier to maintain and can help reduce running costs.

4. Monitoring results suggest that there is little risk of Passive Houses not getting warm or requiring significantly more energy for heating due to users keeping the windows open. There is no need to fear that « human errors » might cause problems, even when bedroom windows are tilted all night long during winter. In this case, the only negative effect is a slight increase in heating energy (see article on user behaviour).

5. Even during cold periods, sometimes it may be nice to be able to open the windows to let in some fresh air, for example during a party or an assembly.

6. Last but not least, an openable window could save one's life as it offers an easy way out in the unfortunate event of an emergency.

II. LITERATURE REVIEW

Magnus Heier, in his master thesis investigated on how in door climate and energy usage affected the choice of window and shading devices in passive house. He in his thesis compared the results found by NCC passive house Kuben with the passive house criteria and Miljobyggnad.

An Irani group in their article expressed important factor, internal and external factor in solar building design. They had also showed the important owner-implementation strategies. They have examined cognitive energy and solar energy in building in their study.

Sustainable energy Ireland (S.E.I.), the national energy agency has provided guide lines for passive building by improving energy efficiency, advancing development and competitive deployment of renewable sources of energy. They combined heat and power, and reduced the environment effect of energy production and use.
Paul Littlefair in his paper reviewed a range of tools to predict solar access in obstructive situation which range from simple angular criteria through sun path diagrams and solar gain indicators to compute program. He also examined criteria and techniques which can be used to evaluate solar access in dense urban layout and ways to protect solar access to existing building.

Chen Chen in his thesis showed the feasibility of developing passive house in China. Based on some assumptions, he calculated the total cost of one passive house standard apartment comes around 10% more than the regular one for a development. But if assumed that the electricity price remain unchanged for next 25 years then the savings from electricity consumption will recover extra cost of by the passive house.

Serkan BLIGIC in his thesis investigated the efficiency of use of passive solar design strategy in existing low rise residential buildings in the context of energy efficient building design. He showed that 3 types of energy needed for space conditioning and visual comfort, maximum energy saving was achieved in heating energy used by 61% decreased, lighting energy is decreased by 40%, but cooling energy is increased by 34%.

U. S. Department of energy have showed that passive solar design takes together various building elements to reduce or remove the need of mechanical cooling and heating techniques in lighting system. Engineers generally focus on sun for thermal conductivity and lighting purpose. So they have design for passive building keeping in mind solar geometry technology and local climate.

III. METHODOLOGY

Passive cooling of building:

- Solar shading
- Shading by overhangs, louvers and awnings etc.
- Shading of roof

- Shading by textured surfaces
- Shading by trees and vegetation
- Induced ventilation techniques:
  1.) Solar chimney
  2.) Air vents
  3.) Wind tower
  4.) Radiative cooling
  5.) Roof pond
  6.) Diode roof
- Evaporative cooling
- Earth berming
- Earth air tunnel
- Earth coupling
- Desiccant cooling

Passive heating of building:

- Insulation
  1.) Sheep wool insulation
  2.) Rockwool insulation
  3.) Mineral wool
  4.) Perlite insulation
  5.) Polyurethane insulation
  6.) Cotton insulation
  7.) Fiberglass insulation
  8.) Cellulose Insulation
  9.) Glazed
- Reflective Coating
- Glazed window

IV. FUTURE SCOPE

We will be designing passive building with following accordance.

Building type : Hotel

- Building features:

1. Air ventilation
2. Natural lighting
3. Thermal comfort
4. Architectural view
5. Ecology

- Building materials:

1. Electroplated steel plates,
2. Triple glass curtain wall,
3. Fiber reinforced concrete panel,
4. Polycarbonate sheet,
5. Walls with vegetal cover

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