NET ZERO ENERGY BUILDING

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Abstract

With some recent development; the zero energy building and near zero energy building has gained a worldwide attention and now it is seen as the future building concept.since such building are now centre of attraction, various advancement in this area are being reported.Zero energy building has unprecedented potential to transform the way building to use energy.Net zero energy building is the link between energy efficient technology and renewable energy utilization. Photovoltaic integration with the building envelope is also discussed for on-site power generation to meet the operational energy demand so as to achieve the goal of net zero energy building and in this paper we are going to discuss about NZEB materials.

Keywords:Zero energy building, Insulation material, Building envelope.

1.INTRODUCTION

A building that produces as much energy on site as it consumes on an annual basis. A building approaching zero energy is called as near zero energy building or ultra-low energy building.Amount of energy provided by on site renewable energy sources is equal to the amount of energy used by the building.It produces as much energy as it uses in a year, when accounted for the source.For electricity, only around 35% of the energy used in a fossil fuel power plant is converted to useful electricity and delivered**.** Buildings that produce a surplus of energy over the year may be called “energy-plus-buildings” and buildings that consume slightly more energy than they produce are called “near-zero energy buildings” or “ultra-low energy houses”.Zero net site energy use: In this type of ZNE, the amount of energy provided by on-site renewable energy sources isequal to the amount of energy used by the building. In the United States, “zero net energy building” generally refers tothis type of building.Zero net source energy use: This ZNE generates the same amount of energy as is used, including the energy used totransport the energy to the building. This type accounts for losses during electricity transmission. These ZNEs mustgenerate more electricity than zero net site energy buildings.Net zero cost: In this type of building, the cost of purchasing energy is balanced by income from sales of electricity to thegrid of electricity generated on-site. Such a status depends on how a utility credits net electricity generation and theutility rate structure the building uses. Net off-site zero energy use: A building may be considered a ZEB if 100% of theenergy it purchases comes from renewable energy sources, even if the energy is generated off the site and in this paper we are going to discuss about NZEB materials.

Advantages of zero energy buildings are:

1. Isolation for building owners from future energy price increases.
2. Increased comfort due to more uniform interior temperatures.
3. Reduced requirement for energy austerity.
4. Reduced total cost of ownership due to improved energy efficiency.
5. Extra cost is minimized for new construction compared to an afterthought retrofit.
6. Higher resale value as potential owners demand more ZEBs than available supply.

Disadvantages of zero energy buildingsare:

1. Initial costs can be higher – effort required to understand, apply and qualify for ZEB subsidies.
2. Very few designers or builders have the necessary skills or experience to build ZEBs.

2. METHODS AND MATERIAL

Concept of Net Zero Energy Building:
A Net Zero Energy Building is a building with zero net energy consumption, meaning that all the energy use by the building is totally based on renewable energy sources created on the site like solar, wind, geothermal,etc. These buildings consequently do not increase the amount of greenhouse gases in the atmosphere. Most zero net energy buildings get half or more of their energy from the grid and return the same amount of energy at other times. Buildings that produce surplus of energy over the year are called as “energy- plus buildings.” The Zero Energy concept allows for a wide range of approaches due to many options for producing and conserving energy

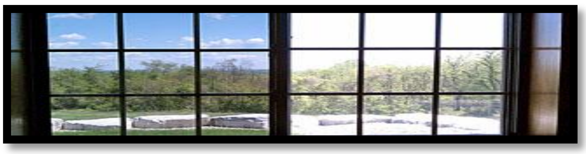
Walls: Walls are a predominant fraction of a building envelope and are expected to provide thermal and acoustic comfort within a building, without compromising the aesthetics of the building. The thermal resistance (R-value) of the wall is crucial as it influences the building energy consumption heavily, especially, in high rise buildings where the ratio between wall and total envelope area is high. The market available center-of-cavity R-values and clear wall R-values consider the effect of thermal insulation. However, the influence of framing factor and interface connections is not taken into consideration (Christian &Konsy, 2006). Walls with thermal insulation have a higher chance of surface (Aelenei&Henriques, 2008). Conventionally, based on the materials used in construction, walls can be classified as wood-based walls, metal-based walls and masonry-based walls.

Roofs

Roofs are a critical part of the building envelopes that are highly susceptible to solar radiation and other environmental changes, thereby, influencing the indoor comfort conditions for the occupants. Roofs account for large amounts of heat gain/loss, especially, in buildings with large roof area such as sports complexes, auditoriums, exhibition halls etc. This reduction in the U-value over the years emphasizes the significance of thermal performance of roofs in the effort to increase the overall thermal performance of buildings. This section provides a number of highly efficient roofs for zero energy building design:

Windows and Doors: Fenestration refers to openings in a building envelope that are primarily windows and doors. The fenestration plays a vital role in providing thermal comfort and optimum illumination levels in a building. They are also important from an architectural standpoint in adding aesthetics to the building design. In recent years, there have been significant advances in glazing technologies.

Windows: Many building designers are aware of the key role that windows play in the performance of the built environment. Heat loss and heat gain through windows occurs at 20–30 times the rate they occur through walls. Proper window performance can ensure that the heating and cooling equipment can maintain a reasonable level of comfort without excessive operating costs.



Slab Material: Precast slab material we used as slab material.

Chajja Material: We use fiber sheet as chajja material which transfers the light through the sheet and avoid water entre through the doors , windows and ventilators.

Frames: The edge components (frame and spacer) of advanced fenestrations should minimize thermal bridging and infiltration losses. The effect of various combinations of frames and spacers on the U-value of different types of windows is described by Robinson and Hutchins (Robinson & Hutchins, 1994). Also, these edge effects are more pronounced in case of smaller size windows.

Types of Insulations:

As the energy use in the building sector accounts for a significant part of the world's total energy use and greenhouse gas emissions, there is a demand to improve the energy efficiency of buildings. To achieve the highest possible thermal insulation resistance, new insulation materials and solutions with low thermal conductivity values have been and are being developed, in addition to using the current traditional insulation materials in ever increasing thicknesses in the building envelopes.

Future Building Insulations:This section provides a brief descriptionof the building insulations that might be used in the near future.

Result

1. The zero net energy consumption principle is viewed as a means to reduce carbon emissions and reduce dependence on fossil fuels.
2. Connection to energy grids prevents seasonal energy storage and oversized on site systems for energy generation from renewable sources like in energy autonomous buildings.
3. Energy efficiency is improved.

Conclusion

As there is dramatic increase in global population, energy use has increased drastically. Today, buildings use approximately 40% of all energy consumed in the world. If we continue on this path of energy use in conjunctionwith population growth projections, with few new sources of fossil fuels,we could deplete all natural resources within fewyears.The buildings sector has major opportunity to reduce environmental impact by incorporating energy efficient technologies in design, construction and operation of both new and existing buildings. Net zero energy buildings are more effective and advantageous, making up applications likely to expand and permitting better and more sustainable energy system

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