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ZERO ENERGY BUILDING: AN ECO-FRIENDLY STRUCTURE FOR ENVIRONMENTAL POLLUTION CONTOL

Shruti V. Yerkar[1], Nayan D. Pawar[2],Pooja D. Mote[3], Prof. Yogesh R. Borkar[4]

[1]*Student,Department of Civil Engineering , JDIET, Maharashtra, India,**shrutiyerkar14@gmail.com***
[2]*Student,Department of Civil Engineering , JDIET, Maharashtra, India, **nayan.pawar1030@gmail.com***
[3]*Student,Department of Civil Engineering , JDIET, Maharashtra, India, **coolpooja.mote@gmail.com***
[4]*Assistant Professor,Department of Civil Engineering , JDIET, Maharashtra, India,*
yogesh_borkar71@rediffmail.com

Abstract

As the zero energy building itself means that the structure constructed or designed by the civil engineer or architecture is able to utilize the natural energy for the need of its own. Zero energy building is converting the waste energy it can be in any type or in any form such as kitchen waste used as bio-fuel, roof rain water used for boar recharge, sunlight for the production of electricity, providing more ventilation to maximizing day lighting and many more. Zero energy building will be helpful in minimizing the use of non renewable natural resources. The initial cost of the structure is more but it will be providing the facilities which will cause to reduce the overcoming bills. As it is one form of green building the structure is also called as the eco-friendly structure. The need to address the interrelated problems of improving energy efficiency and increasing renewable energy use and maintaining healthy indoor environment and increasing the sustainability of resources is a global concern .The new technologies and practices arising from these activities will transform how buildings are designed, engineered, constructed, operated and maintained, renovated and reused and demolished. They will reduce the consumption of energy and material resources and the associated emission and the pollutant impact on the building occupant and the environment. High performance buildings of the future must address the energy and environmental consideration through life cycle assessment of building and their components, site location and development impacts.

Keywords: Net zero, Energy Security, Energy Efficiency, Greenhouse.

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Introduction

Construction of Buildings have a significant impact on energy use and the environment. Commercial and residential buildings use almost 50% of the primary energy and approximately 70% of the electricity .The energy used by the building sector continues to increase rapidly , primarily because new buildings are constructed faster than older ones. Electricity consumption in the commercial building sector doubled between 1980 and 2000, and is expected to increase another 50% by2020 . Energy consumption in the commercial building sector will continue to increase until buildings can be designed to produce enough energy to the growing energy demand of these buildings.

Literature Review:

The following is a literature review provided by the ZEB definitions and research projects.

1. Energy focus

Total energy demand in the building is a sum of thermal and electricity demand; however, many studies focus only on one demand neglecting the other. In some cases, this has resulted in 'zero-energy buildings' which, it is true, do not need any heat supply but indirectly need electricity, e.g., to operate the heat pump included in the system."

2. Energy supply system

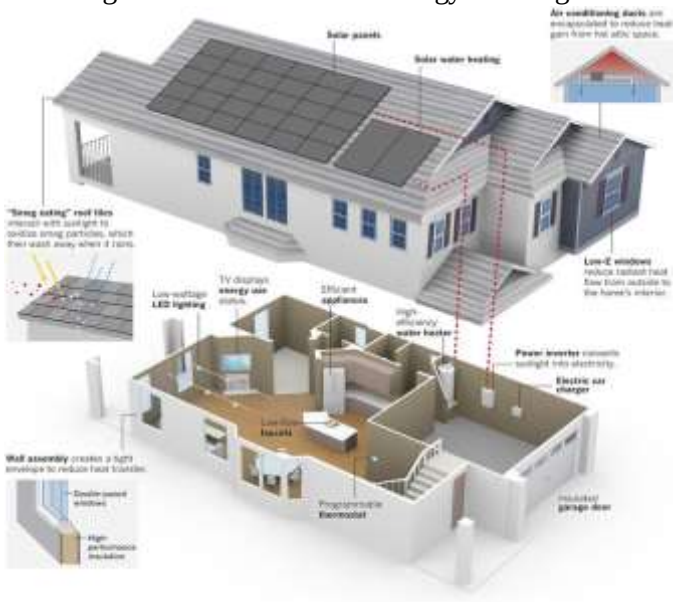
The scientific publications focus either on off-grid ZEB. The main dissimilarity between those two approach is that, the off-grid ZEB do not have any bond to the energy infrastructure, thus it does not purchase energy from any outside source, and the boundaries for the balance calculations are within the building.. Therefore, it is has a possibility for both buying and selling energy from/to the utility grid. This division is also well noticeable in the ZEB definitions.

3. Renewable energy options

In a ZEB is define as the supply side to the renewable energy sources. According to Torcellini, et al. (2006) there are two options: on-site supply or off-site supply. in the on-site supply authors distinguish building footstep and building site. Within the off-site supply the building either uses renewable energy sources available off-site to produce energy on-site, or purchase off-site.

Methodology

The most cost effective way towards a reduction in a building's energy consumption usually occurs during the design process. To achieve efficient energy use, zero energy design departs significantly from conventional construction practice. Successful zero energy building designers typically combine time tested passive solar, or artificial conditioning, principles that work with the onsite assets. Sunlight and solar heat, existing breezes, and the cool of the earth below a building, can provide day lighting and steady interior temperatures with minimum mechanical means. ZEBs are normally optimized to use passive solar heat gain and shading, combined with thermal mass to even out diurnal temperature variations throughout the day, and in most climates are super insulated. All the technologies need to create zero energy buildings.



There are various NZEB supply options available today. These options are chatagerised as below,

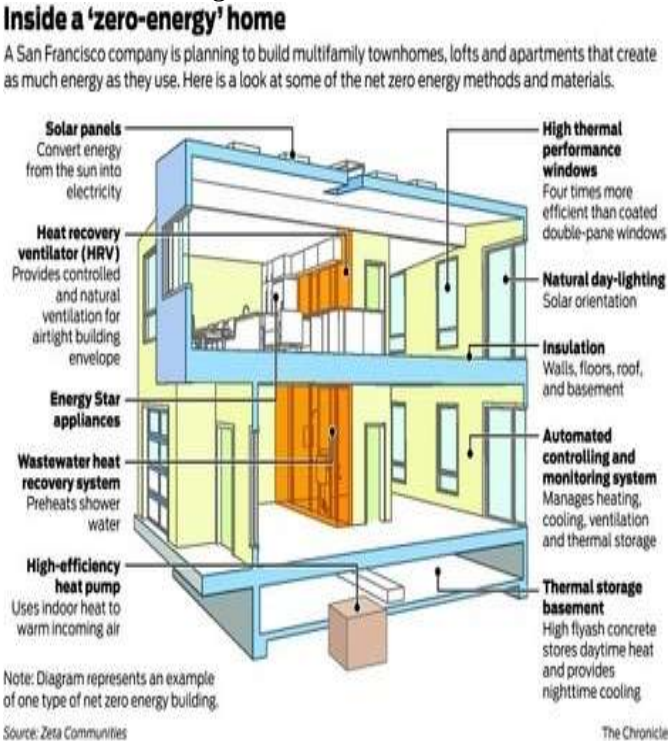
a. On-site Demand Management

b. On-site supply options

c. Off-site supply options

Advantages

- Isolation for building owners from future energy cost increases
- Increased comfort due to more-uniform inner temperatures
- Reduced necessity for energy austerity
- Reduced total cost of ownership due to better energy efficiency
- Reduced total monthly cost of living
- Extra charge is minimized for new construction compared to an afterthought retrofit
- Advanced resale value as potential owners demand more ZEBs than available supply
- The value of a ZEB building relative to similar conventional building should increase every time energy cost increase
- Future legislative restrictions, and carbon discharge taxes/penalties may force expensive retrofits to inefficient buildings.



Disadvantages

- Primary costs can be higher - effort required to understand, apply, and qualify for ZEB subsidies
- Very few designers or builders have the necessary skills or knowledge to build ZEBs
- Feasible declines in future utility company renewable energy costs may lessen the value of capital invested in energy efficiency
- New photovoltaic solar cells equipment technology price has been falling at roughly 18% per year - It will lessen the value of capital invested in a solar electric generating system - Present subsidies will be phased out as photovoltaic mass production lowers future price
- Challenge to improve higher initial expenditure on resale of building - appraisers are uninformed - their models do not consider energy
- While the individual house may use an average of net zero energy over a year, it may order energy at the time when peak demand for the grid occurs. In such a case, the capacity of the grid must still provide electricity to all loads. Therefore, a ZEB may not reduce the required power plant capacity.

- Solar energy confine using the house envelope only works in locations unobstructed from the South. The solar energy capture cannot be optimized in South facing shade or wooded surroundings.

Reference

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3. Internet
4. Opinion of experts
5. Own idea