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Review Paper on Zero Energy Building

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Abstract - *As we know that the concept of zero energy building has gain wide attention in last few years & now, we can see that the future target for the design of zero energy building. In recent year the concept of zero energy building has attracted international interested. There is a worldwide attempt to define the concept of Zero energy building.*

According to European commission now days building consumes nearly about 30% to 40% of energy produced worldwide and hence it is responsible for 36% of CO2 emission.

Key Words: Zero energy building, intelligent system, Energy Consumption, Energy Resources, PV Solar Module.

1. INTRODUCTION

The energy requirement of each building depends on its utility. Another important factor related to the required of energy is the geographical position of each building. There are three categories of building according to their use:

- Commercial.
- Public.
- Residential.

Zero energy building which are connected to grid are Nearly zero energy building, Net zero energy building And Net plus or positive energy building. The goals of zero energy building takes us out of designing low energy building with the energy saving goal into sustainable energy. The goal that are set & how those goals are defined are critical to the design process. Because design goals are so important to achieving high performance building, the way a zero-energy building goal is defined to understanding the combination of applicable efficiency measures and renewable energy.

1.1 Zero Energy Building.

As we know that zero energy building is also known as net zero energy building which means that a building with net zero energy consumption that the total amount of energy is used by a building on an annual basis is equal to the amount of renewable energy. It based on the concept of building within its boundaries, produces as much energy consumed on an annual basis. In order to be appropriate for use, building should be providing comfort condition for people who are inside.

Fig -1: Zero Energy Building.

1.2 INTELLIGENT ZERO ENERGY BUILDING.

The term Intelligent zero energy building (I ZEB) is even harder to defined, when there are so many approaches for zero energy building & its characteristics intelligence. If someone would like to see that in the past the concept of intelligent zero energy building begin, then they should go back to ancient, where houses were build oriented to the sun in order to take advantages of the solar radiation.

The 1st step to construct the Intelligent zero energy building is its design, and several design optimization techniques.

Table -1: Zero Energy Building Definitions Summary

Definition	Pluses	Minuses	Other Issues
Site ZEB	• It is Easy to implement. • Conservative approach to achieving ZEB. • Encourages energy-efficient building designs.	• It requires more PV export to offset natural gas. • It does not consider all utility costs (can have a low load factor). • It not able to equate fuel types.	
Source ZEB	• It is Able to equate energy value of fuel types used at the	• It does not account for differences between fuel types	• It will Need to develop site to-source conversion

	site. • Better model for impact on energy system. • Easier ZEB to reach.	(supply availability, pollution). • The Source of energy use accounting can have a larger impact than efficiency technologies. • It Does not consider all energy costs (can have a low load factor).	factors, which require significant amounts of information to define.
Cost ZEB	• It is easy measure. • The market forces result in a good balance between fuel types. • Allows for demand-responsive control. • Verifiable from utility bills.	• It May not reflect impact to national grid for demand, as extra PV generation. • It requires net-metering agreements such that exported electricity can offset energy and nonenergy charges.	• This consist of Offsetting monthly service and infrastructure charges require going beyond ZEB. • It is not well established, often with capacity limits and at buyback rates lower than retail rates.
Emissions ZEB	• He accounts for nonenergy differences between fuel types (pollution, greenhouse gases). • Easier ZEB to reach.		• It Need appropriate emission factors.

2. PASIVE SOLAR DESIGN.

Passive solar design refers to use of the energy of sun for the heating and cooling of living area by exposer of the sun. When the sun light strikes on building, the building materials that can reflect the solar radiation.

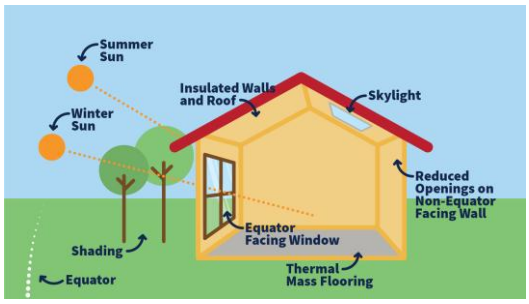

Fig -2: Passive Solar Design

2.1 RENEWABLE ENERGY RESOURCES.

Renewable energy, often referred to as clean energy, comes from natural sources or processes that the constantly replenished. And the renewable energy resources include solar energy, wind, geothermal, biomass, waves and tides.

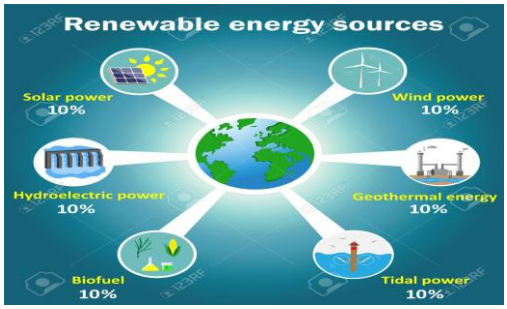

Fig -3: Renewable Energy Resources.

2.1 SUN AS RENEWABLE SOURCE OF ENERGY.

- Active solar include the use of photovoltaic system, solar power and solar water heating to harness the energy.
- Solar panels are placed on the rooftop or windows of the building, or anywhere maximum solar energy is received through year.

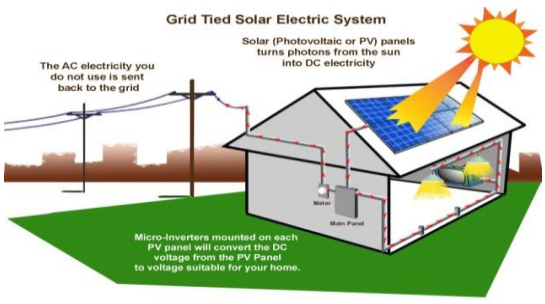

Fig -4: Sun as Renewable Source of Energy.

2.1 WIND AS RENEWABLE SOURCE OF ENERGY.

Wind energy is a source of renewable energy. It does not contaminate, it reduces the use of fossils fuels, which are the origin of greenhouse gasses that cause global warming.

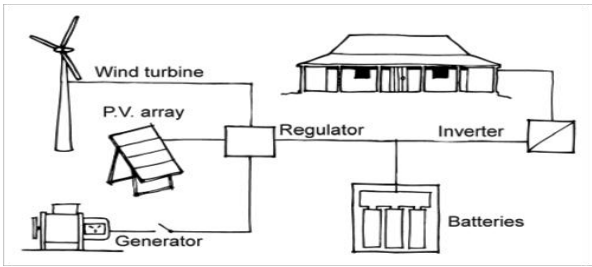

Fig -3: Wind as Renewable Source of Energy.

3. ZERO ENERGY BUILDING IN INDIA.

3.1 The Indira Paryavaran Bhavan.

First zero energy building in India is The Indira Paryavaran bhavan which has been constructed with adoption of solar passive design and energy efficient materials. The building is organized by the energy resources institute (TERI). And the building boasts an Earthquake resistant structure with total area of 31,488 square meters.

3.2 Sun Carrier Omega.

The building is commercial building which is located in Bhopal. The buildings features sun tracking solar photovoltaic generators integrated with huge energy storage. The solar system generates and store enough energy to fulfill the electrical and air conditioning needs of the building.

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3.3 Akshay Urja Bhavan.

The building is located in Panchkula, Haryana. The department of renewable energy/HAREDA, had constructed its office building 'akshay urja bhavan' on an institutional plot measuring 1 acre, this building is covering 55,000 square meters.

4. ADVANTAGES.

- Isolation for building owner from future energy price increases.
- Increased comfort inside the house.
- Reduced requirement for energy.
- Minimized extra cost.

5. DISADVANTAGES.

- Initial costs can be higher.
- Lack of skills or experiences to build ZEB.
- ZEB may not reduce the required power plant capacity.
- Without an optimized thermal envelope, the embodied energy, heating and cooling energy and resources usages is higher hands.

6. CONCULSION.

The zero-energy building concept will help to reduce the Global warming and helps to retain the nature. In zero energy building using solar energy is the best energy source to save the energy and cost efficiency. The installation of solar panels initially will be costly, but as we know that it will reduce the energy consumption so the owner of the building in future, they can save money on their electricity bill. The solar panels that would be installed on the back side of the building, which should be facing south.

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