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Net Zero Energy Building

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Abstract: ***In this Report NZEB with providing Solar panels and other technics used. And It compared with conventional building. Its structure will be Net Zero Carbon Emission and to do researches to discover the most efficient possible route to attain NZEB. To prove that the structure created is green sustainable and Eco-friendly.***

Keywords: Renewable energy sources, Green Material, Solar panels and Its Components, Comparison between NZEB and Conventional Building

I. INTRODUCTION

A Net Zero Energy Building is a building with zero energy consumption, that all the energy use by the building is totally based on renewable energy sources created on the site like solar, wind, biogas, etc. The main aim is to reduce carbon emission and reduce dependence on fossil fuels.

Last 20 years more than 200 dignified project claiming net zero energy balance have been realized all over the world which extensively utilized the renewable energy sources to earn the tag of NZEB. It is very important to study the implementation of NZEB because of shortage of growing active energy resources**.**

Most net zero energy building get half or more of their energy from the grid, and return the same amount at other times. Most NZEB use the electrical grid for energy storage but some are independent of the grid. Energy is usually harvested on site through energy producing technologies like solar and wind while reducing the overall use of energy with highly efficient HVAC and lighting technologies.

II. METHODOLOGY

This entire project is a planning and design in nature and the methodology followed in this project is listed as below.

A. Selection of site where renewable energy is available Pune has a tropical wet and dry climate. The weather is hot and humid for most of the year. The hottest part of the year is late May to early June. Hence solar energy is available on the site which makes the site suitable to harness solar energy

B. Study the climate conditions of area The city lies between $18^0$32” North latitude and $73^0$51” East longitude. The weather is hot semi-arid for most of the year. Maximum temperatures is around 19-33 °C (66–91 °F). The highest recorded temperature is 43.3°C (109.9 °F)

C. Aligning the building to utilize maximum amount of renewable resources

D. Planning and design of proposed NZEB building

E. Comparison of the NZEB building with other conventional building

III. RESULT AND DISCUSSION

A. Realistic design constraints

1) Economic: Building shall be designed such that the entire energy requirements are met by solar energy only due to shortage of conventional energy.

2) Sustainability Constraints: The design shall be such that the requirement of cooling do not fluctuate throughout the year.

3) Economic Constraint: The materials adopted for construction are economical compared to conventional materials.

B. Probable outcome

The two types of buildings are analyzed with respect to cost, time, availability of skilled labour and ease in construction.

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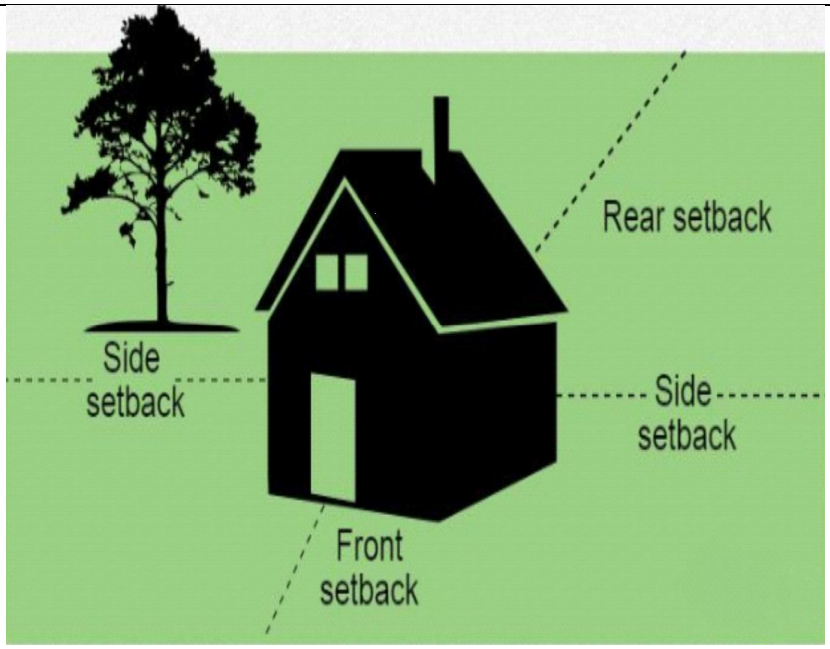
	COST	ELECTRICITY	AVAILABILITY OF RESOURSES
 NORMAL CONVENTIONAL BUILDING	Low	It requires an active source	Easily Available
NZEB	High	Produced on its own	Difficult

C. *Development Control Rules for Pune Metropolitan Area, 2014*

1) Primary Residential Use Zone: In this primary residential use zone, buildings shall be permitted only for the following purposes and accessory uses.

a) Professional consulting offices of the residents and incidental uses there to occupy a floor area not exceeding 40 square meters.
b) Petty shops dealing with daily essentials including retail sale of provisions, soft drinks, cigarettes, newspapers, tea stalls, mutton stall and milk kiosks, cycle repair shops and tailoring shops.
c) Nursery, primary and high school.
d) Parks and playgrounds occupying an area not exceeding 2 hectares
e) Taxi stands and car parking.

Marginal distance according to the PMRDA code is shown in Table 2

Table 2. Marginal Distance in relation to height of the Building

Height of Building	Road	Front	Side And Rear
Upto 15 m.	6.00m	4.5m	h/4
Above 15m and below 21m	6.00m	4.5m	h/4
Above 21m and below 24m	9.00m	6.00m	7.5m
Above 24m and below 30m	9.00m	7.5m	7.5m
Above 30m and below 36m	9.00m	7.5m	7.5m
Above 36m and below 50m	12.00m	9.00m	9.00m
Above 50m and below 70m	18.00m	12.00m	10.00m
Above 70m and below 100m	20.00m	12.00m	12.00m
Above 100m	24.00m	15.00m	16.00m

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D. Conformation to national building code of India

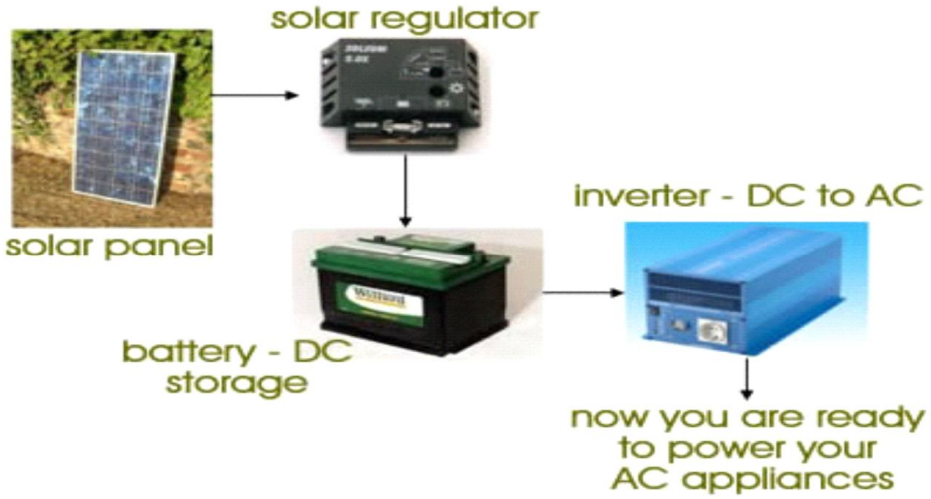
In so far as the determination of sufficiency of all aspects of structural designs, building services, fire protections, plumbing, electricity, construction practice and safety are concerned the specifications, standards and code of practices recommended in the National Building Code of India, shall be fully confirmed to any gap in a wall thereof shall be deemed to be a breach of the requirements under these rules.

Every multi-storied development constructed shall be provided with;

1) Lifts as authorized in National Building Code;
2) A stand by electric generator of adequate capacity for running lift and water pump, and a room to accommodate the generator
3) A room of not less than 6 meters by 4.5 meters in area with a minimum head room of 3 meters to accommodate electric transformer in the ground floor; and
4) At least 1 meter room of size 2.4 m. x 2.4 m. for every 10 consumers or three floor whichever is less. The meter room shall be provided in the ground floor.

E. Net Zero Energy (Green) Materials

1) *Bricks:* Hollow Bricks are considered as the Green material of Construction. So in this case it is used in the Green Construction.
2) *Cement:* If PPC (Portland Pozzolana Cement) is used in construction, it will be green Material Because PPC contains the flyash as the main ingredients.
3) *Green Paints:* Paints with reduced levels of VOCs are more Eco-friendly than Conventional paints, Some house paints have an even lower environmental impact. Homeowners can select premium-grade zero-VOC paints that also use VOC-free colorants, are free of vinyl and other plasticizers and include no toxic biocides.
4) *Green Wood or Engineering Wood:* Engineered wood products are made from a combination of wood fibers, strips, and veneer sheets. Smaller diameter trees of the same hard and soft Wood used to manufacture lumber are also used. Engineered wood products are also called composite wood, and the materials are bonded together using an adhesive resin which makes the finished product resist warping. Some different products made from engineered wood include flooring, Several types of lumber, and particle board.
5) *LED Fixtures:* In green buildings, the only type of the lighting fixtures used is LED (Light Emitting Diode) Fixtures. This type of lighting fixtures are somewhat costly, approximately 4 times higher price than the normal ones. These are solid lights which are extremely energy-efficient. A significant feature of LEDs is that the light is directional, as opposed to conventional bulbs which spread the light more spherically.
6) *IG Units:* Nearly 15-20% of all home energy is lost via windows and doors, having energy efficient windows in your home should be a priority. For that, the best suitable option is to use LOW-E glasses. The main aim of DG Glasses is to prevent heat on the side of glass where it originates.
7) *Solar Panel and its Components*



Working of solar panels

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The solar panel consists of solar regulator it is connected to DC storage battery and then DC is converted to AC by an inverter. AC can be directly used for the appliances.

a) Working of solar panels

The solar panel converts sunlight into DC power or electricity to charge the battery.

i) This DC electricity (charge) is controlled via a solar regulator which ensures the battery is charged properly and not damaged and that power is not lost/(discharged).

ii) DC appliances can then be powered directly from the battery.

iii) AC appliances need a power inverter to convert the DC electricity into 220 Volt AC power.

F. Comparing The Net Zero Energy Building With Conventional Building

Table 3. Comparison of NZEB and Conventional Building

Sr.no.		NZEB	CONVENTIONAL
1	Windows and Opening	Insulated Glass (IG Units)	Aluminium Panelled Plain Glasses
2	Lighting Fixtures	Low Watt LED Tube Lights and Bulbs	Tube Lights and CFLs
3	Plumbing Fixtures	Special Green Fixtures	Conventional Fixtures
4	Flooring	PVC Flooring, Glazed tiles and China Mosaic	Vitrified and Glazed tiles and China Mosaic
5	Doors	Engineering Wood	Pine Wood
6	Paints	Plastic Non VOC	Plastic VOC
7	Bricks	Hollow Bricks	Clay Bricks
8	Cement	PPC	OPC
9	Temperature	4 to 5 degree less compared to conventional building	More than NZEB
10	Electricity	Produce its Own	Its require an active sources

IV. CONCLUSION

In this research we have compare the Conventional building and NZEB was completed by using the parameters such as Temperature, Bricks, Paints, Flooring, etc. In NZEB we are used convenient Lighting fixtures like LEDs.

We conclude that ZEB is important mainly for increasing in the Energy price. We can save non-renewable energy sources like electricity, fuel, water, etc. ZEB is beneficial for the Owner because free from energy consumption bills. ZEB is totally environment friendly and Eco-friendly.

Hence by using the renewable resources the impact on the active energy loads can be reduced, thus we can conserve electricity locally and globally.

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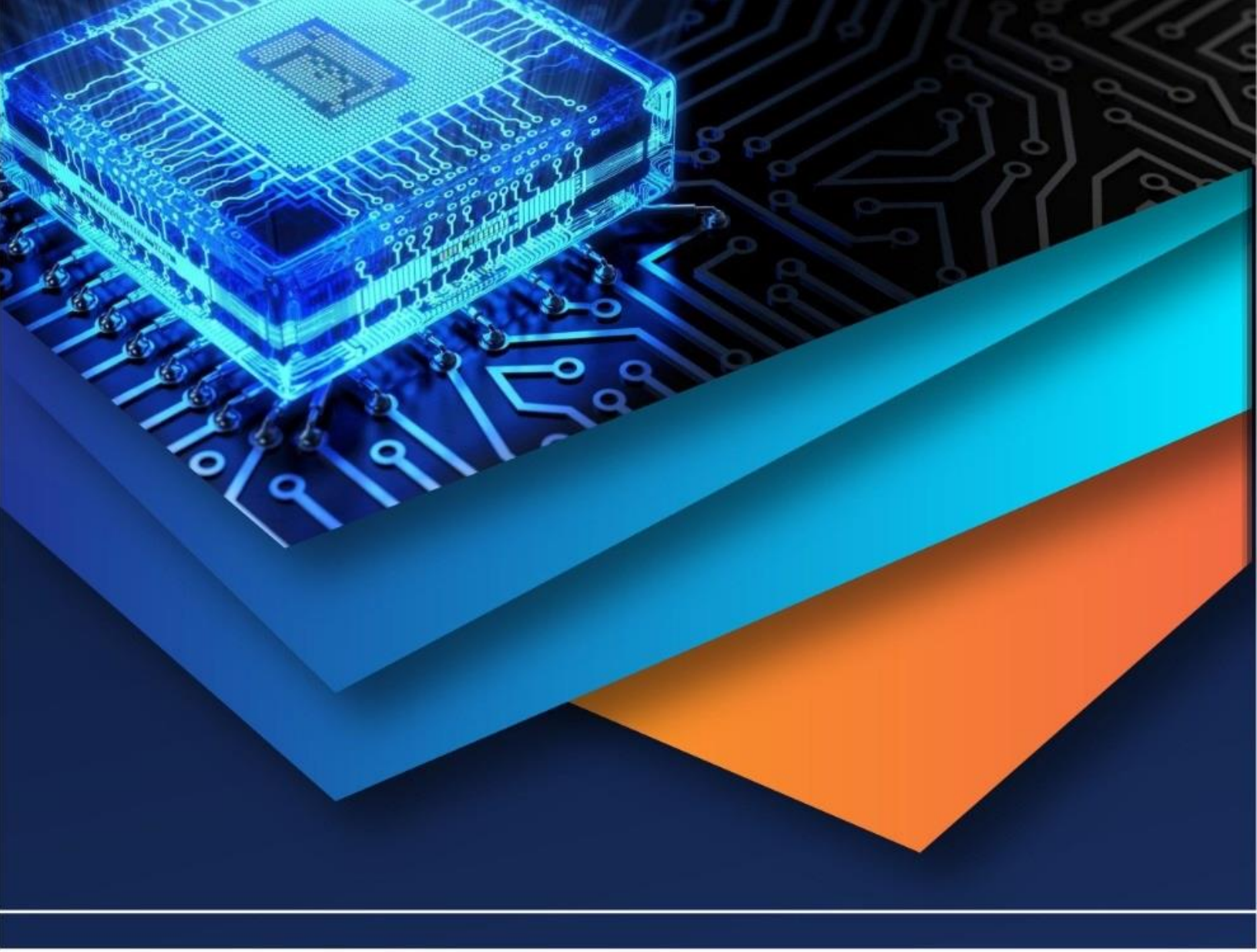

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