

Net Zero Energy Buildings

February 11, 2021

In news : While virtually inaugurating the Platinum Jubilee Foundation Day of Central Building Research Institute (CSIR-CBRI), the Vice President of India stressed upon the need for Net Zero Energy Buildings and he also stressed the need for providing affordable, safe and durable housing to the growing middle classes without compromising on quality

What are Net Zero Energy Buildings?

Net or nearly zero energy buildings (NZEB) are highly efficient buildings with extremely low energy demand, which is met by renewable energy sources. Such buildings produce as much energy as they consume, accounted for annually.

Net Zero Energy Buildings (NZEB) are the next level of high-performance buildings. India is in a unique position to develop an energy efficient new building stock that is yet to be designed until 2030

How can it be achieved?

In order to achieve their net zero energy goals, NZEBs must first sharply reduce energy demand using energy efficient technologies, and then utilize renewable energy sources (RES) to meet the residual demand. In such buildings, efficiency gains enable the balance of energy needs to be supplied with renewable energy technologies. This is the most logical approach to reach NZEB goal.

Various definitions of Net Zero Energy Buildings(NZEB)

Definitions of NZEB are critical in determining the path to zero energy goals, and significantly influence design choices of architects and building owners. Appropriateness of definitions to a project vary according to project goals and

values of the designer and building owner, making it essential for them to understand which definition will suit their purpose best.

Net Zero Site Energy Building

- A site ZEB produces at least as much energy as it uses in a year, when accounted for at the site
- Site NZEBs encourage a relentless pursuit of energy efficiency, as the quantum of renewable energy supply options on a given site is limited.
- Site Energy refers to the energy consumed and generated at a site (e.g. a building), regardless of where or how that energy originated.

Net Zero Source Energy Building

- Source Energy refers to primary energy needed to extract and deliver energy to a site, including the energy that may be lost or wasted in the process of generation, transmission and distribution.
- A source ZEB produces at least as much energy as it uses in year, when accounted for at the source
- Source or primary energy is the measure of net zero status for source NZEBs. Primary energy is the energy used to generate and deliver secondary energy (predominantly electricity in the case of India) to the site.
- Energy supplied to the source NZEB site and exported from it gets multiplied by site-to-source conversion factors which allow energy used for generation in power plants and transmission to be factored.

Net Zero Energy Cost Building

- Net Zero Energy Cost is perhaps the simplest metric to use: it means that the building has an energy utility bill of \$0 over the course of a year
- Net zero energy cost buildings must have low peak

demands and higher energy savings so that they have lower price tariffs and in turn, lower utility bills

- Cost NZEBs are also not feasible without policies like feed-in-tariff and net metering, which facilitate buying back of electricity by utilities

Net Zero Energy Emission Building

- A Net Zero Energy Emissions building either uses no energy which results in emissions or offsets the emissions by exporting emissions-free energy (typically from on-site renewable energy systems)
- A net-zero emissions building produces at least as much emissions-free renewable energy as it uses from emissions-producing energy sources
- Carbon, sulphur oxides and nitrogen oxides are included in calculating emissions neutrality

New Paryavaran Bhavan a Green Building of India

In the year 2015, the Union Minister for Environment, Forests and Climate Change showcased to the UN Secretary General salient features of the Green Building and highlighted that the design philosophy of the New Paryavaran Bhavan focused on increasing the efficiency of resource usage i.e. energy, water and materials while minimizing the impact of the building on Human Habitat and the Environment.

The architectural design of the building is primarily based on following concepts.

- Preservation of maximum possible number of trees standing over the site
- Solar Passive Architecture with proper orientation and shading of Fenestrations
- Appropriate building envelope design with envelope insulation to reduce heat intake.
- Use of permanent, durable and local materials such as sand stone on exterior face, low heat transmission

glass, reflective roofing, etc.

- Priority for pedestrians in the front, with vehicular access on the sides of the building
- Reduction of conventional lighting load by ensuring 75% day-light use
- Natural ventilation due to stack effect
- The building is designed in such a way that there is free ventilation across the entire building.