

## **Towards Net-Zero Energy buildings : An effective method of energy control in urban areas**

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### **Abstract**

A net zero-energy building (ZEB) is a residential or commercial building with greatly reduced energy needs through efficiency gains such that the balance of energy needs can be supplied with renewable technologies. Despite the excitement over the phrase “zero energy,” we lack a common definition, or even a common understanding, of what it means. In this paper, we want to explore the concept of zero energy: what it means, why a clear and measurable definition is needed, and how we have progressed toward the ZEB goal. Given the need to reduce building sector related energy consumption and greenhouse gases (GHG), passive and sustainable buildings are focal points. Simple methods and techniques, which use appropriate building design, material, and systems selection, and reflect consideration of the local environmental elements, such as air and sun, provide thermal and visual comfort with less non-renewable energy sources. These techniques are referred to as environmental or bioclimatic design. Passive principles exploit the design and properties of the building envelope to minimize or maximize the heat losses and heat gains respectively, to reduce the energy demand. In addition to passive, active measures such as heating systems and solar power technologies are used to produce and distribute the energy needed to achieve the comfort of the occupants. The present chapter aims at giving an overview of design principles that result in more comfortable and energy-efficient buildings and the role of Net Zero-Energy buildings in energy control in urban areas. Passive design principles are in line with environmental design concepts. The environmental design principles can be beneficial to the building performance, whether the design ambition is to have a comfortable and functional building with reasonable energy demand or goes as far as achieving sustainable standards such as zero-energy or passive house.

**Key words:** ZEB, Passive Building Design Strategies, Energy Control, Environment, Urban Pollution, Urban Area