

Chapter 15

Internet of Things for High Performance Net Zero Energy Buildings

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ABSTRACT

Due to globalization, demand per capita has increased over the decade; in turn, standard of living has been increased. The emission of carbon dioxide is increasing exponentially in construction industries, which affects the global ecological system. To reduce the global warming potential, net zero energy buildings are very essential. With respect to technological advancements in information technology, the internet of things (IoT) plays a vital part in net zero energy buildings. In this chapter, the various issues and challenges of high-performance zero energy buildings are elaborated using different scenarios.

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INTRODUCTION

The building architecture is commercially based on their functional, aesthetic and luxury needs. In the commercialized world, the engineers and construction work force utilize maximum embodied energy with higher carbon emission.

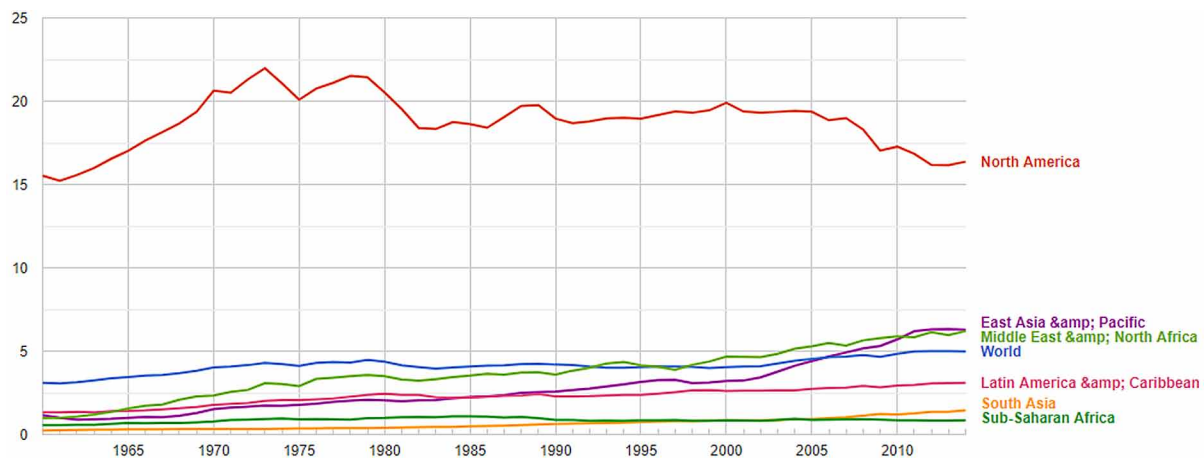
Vernacular architecture is evolved based on ecological, Societal and economic conditions. The materials used were locally available in nature. Vernacular architecture is predominantly seen in ancient and historical Indian places such as Karnataka, Tamilnadu, Kerala, Rajasthan, and Jaipur. This is later discarded due to globalization, irrespective of climatic conditions, the real estates have aped the west and buildings with glass facades have become popular in India. These kind of building trap the heat inside the building and hence the need of HVAC systems in the building, which causes carbon emission. (Nayak & Prajapati, 2006).

Materials and technology required for conventional buildings have high Embodied Energy and Embodied Carbon as they uses materials such as river sand, natural wood, cement, red burnt brick. Technology such as square footing, Burnt Brick Masonry (BBM), flat slabs which consumes more amount of concrete and many more. (Buchanan & Honey, 1993).

The ecological imbalance is majorly due to depletion of ozone layer and emission of toxic gases. The extraction of natural materials namely river sand, natural wood, stones, fertile soil which does not contain any reused materials for constructing conventional buildings. More often conventional buildings utilize more energy which imbalances the ecosystem. The orientation towards the emission of carbon across the globe is elaborated in the Figure 1.

Figure 1. World Carbon dioxide emissions in metric tons per capita

Source <https://www.worldbank.org/>



The emission of carbon in South Asia is around 1.46 MT of CO₂/capita North America is around 21.98 MT of CO₂/capita in year 1973 & 15.22MT of CO₂/capita in 1961 & presently 16.37 MT of CO₂/capita (2014 recent data) Overall world 4.98 MT of CO₂/capita which was predicted from the Carbon

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