Abstract

India is one of the fastest growing economies in the world. Energy consumption in India has become more than double since 2000 due to population growth and economic development. Energy is closely related to the growth of human civilization in all over the world. Energy is required in every aspect of modern day to day life. Fossil fuels are the main source of energy in India. Among the fossil fuels, coal is the largest source in the energy mix. Significant amount of emissions come from the combustion of fossil fuels. India is globally third largest emitter of CO_2.

Residential and commercial building sector in India accounts for 32% of the total electricity consumption. It is predicted that electricity demand expected to increase from 421 TWh in 2022 to 2,421 TWh by 2047. The building sector in India consumed 13% of total energy consumption in 2023-24 and the energy consumption is expected to increase at 5% each year. Total commercial building floor area in India in 2017 was estimated to be 1.1 billion m^2 and predicted to reach an estimated 1.78 billion m^2 by 2027. Commercial building sector is expanding at over 9% per year due to economic growth in India. It has been estimated that more than 50% of building floor area that will exist in the year 2030 is yet to be built. So, there is immense scope of energy conservation with the adoption of energy efficiency measures in building sector in India.

Daylighting is an important strategy in modern building architecture to replace artificial lighting to reduction of the building energy consumption and better visual comfort. In the present study clear glass window combinations are considered as daylighting systems in buildings. Energy performance of buildings with eleven different window combinations, five different WWR has been investigated in three different locations in India.

The result of this study quantify the energy savings opportunity in commercial buildings through the parametric study of WWR, distribution of glazed surface and slat angle along with control of artificial lighting of the buildings according to available daylight inside the building working space. Energy savings in the building from this strategy is used to quantify long term energy savings, economic benefits and capacity avoid due to potential daylight integration in Indian commercial buildings.