

Retrofitting Residential Buildings for Energy Efficiency: An Experimental Investigation

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Abstract : Buildings are major consumers of energy in both their construction and operation. They account for 40% of World's energy use. It is estimated that 40-60% of this goes for conditioning the indoor environment. In India, like many other countries, the residential buildings have a major share (more than 50%) in the building sector. Of these, single-family units take a mammoth share. The single-family dwelling units in the urban and fringe areas are built in two stories to minimize the building foot print on small land parcels. And quite often, the bedrooms are located in the first floors. The modern buildings are provided with reinforced concrete (RC) roofs that absorb heat throughout the day and radiate the heat into the interiors during the night. The rooms that are occupied in the night, like bedrooms, are having their indoors uncomfortable. This has resulted in the use of active systems like air-conditioners and air coolers, thereby increasing the energy use. An investigation conducted by monitoring the thermal comfort condition in the residential building with RC roofs have proved that the indoors are really uncomfortable in the night hours. A sustainable solution to improve the thermal performance of the RC roofs was developed by an experimental study by continuously monitoring the thermal comfort parameters during summer (the period that is most uncomfortable in temperate climate). The study conducted in the southern peninsular India, prove that retrofitting of existing residential building can give a sustainable solution in abating the ever increasing energy demand especially when it is a fact that these residential buildings that are built for a normal life span of 40 years would continue to consume the energy for the rest of its useful life.

Keywords : energy efficiency, thermal comfort, retrofitting, residential buildings

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