

## **ABSTRACT**

Turkey has a large energy potential for reducing CO<sub>2</sub> emissions by energy consumption in residential buildings, applying sustainable design strategies and renewable energies. Two critical elements of building energy consumption are climate and building energy standards, thus, a new detailed climate analysis of Turkey was prepared by using the classification methods in ASHRAE transactions 4610-4611. A review of building energy standards for selected countries allows for comparison with Turkey regarding standard updates or preparation. Four typical residential building types from Turkey were selected and analysed as to their energy consumption and thermal comfort, using the TRNSYS simulation program. Three of the building types are pre-fabricated and one is realised in a traditional building technology, which represents a significant number of dwellings in Turkey. The thermal simulation of the building types was carried out for three different climatic zones of Turkey: Hot, Moderate and Cold. The variation of design parameters shows, that high energy savings can be achieved by basic design strategies, including ventilation, orientation of large window areas with respect to solar heat gain, thermal insulation of building envelope, and utilization of thermal mass. It is shown in a systematic approach, how the thermal comfort and the energy performance for typical buildings and climatic zones of Turkey can be improved to a level, which is comparable with advanced European standards of high comfort and low energy buildings. The remaining energy demand can partly be provided by integrating renewable energy technologies in the building such as solar thermal or photovoltaic panels.

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