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## FEASIBILITY ANALYSIS OF PASSIVE THERMALLY ACTIVATED BUILDING SYSTEM FOR VARIOUS CLIMATIC REGIONS IN INDIA

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**ABSTRACT:** Thermally activated building system (TABS) is a hydronic cooling system, in which cold water is circulated through pipes embedded in the building structure to remove the heat from the indoor space. This paper proposes a hybrid passive cooling system, in which TABS is integrated with a cooling tower. The performance of this integrated system greatly depends on the climatic conditions of the geographical area. Hence, the feasibility of the proposed system to provide thermal comfort in twelve Indian cities spread over five different climatic regions is investigated using COMSOL Multiphysics. Different cooling scenarios like Roof and Floor cooled TABS (RF) and All Surfaces cooled TABS (AS) are compared. The proposed system performs well in arid and semi-arid regions, and the RF scenario is sufficient to achieve thermal comfort. The system is able to reduce the indoor operative temperature by 14°C for the arid climatic conditions of Jaipur. In the other three regions, i.e., humid subtropical, tropical wet and dry and tropical wet regions, the performance of the proposed system is relatively low and the AS scenario is required to achieve thermal comfort.

**Keywords:** Passive cooling; cooling tower; thermal comfort; thermally activated building system; evaporative cooling; energy conservation

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