

**The Cost Effectiveness of Typical Materials in Relation to Indoor Comfort of Passive Cooling Strategies Appropriate for Small One Storey House in Chiang Mai, Thailand**  
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Abstract

Chiang Mai is a quick developing city in Thailand. Due to the migration of people from the whole country, it is rapidly requiring residential properties. Housing projects have continuously increased around the city. Electricity consumption from mechanical cooling systems has become an obvious known major cost especially in summer when many of the air-conditioning packages are purchased

Based on thermal comfort for Thais, this study suggests the appropriate building materials are those most common in a locale and are considered as simple appropriate natural passive cooling strategies on a typical sample of a small one storey house corresponding to applied traditional living and beliefs. Two different weather conditions, hot-dry and hot-humid, were selected to represent seasonal climates. Computer simulations on thermal effects and ventilation were processed by CFD software, FLOVENT 6.1. Ordinary building materials were chosen to compare the relationship between outdoor-indoor temperature differences and their costs.

It was found that natural cross ventilation is the best solution for a small one-storey house with additional assistance from thermal mass effect. The most effective typical wall and roof materials are the conventional 10cm brick wall and 5mm corrugated fibrous cement roof which gave the best performances close to comfort temperature at a unit investment cost. Simulated results also showed that the same house with a typical horizontal ceiling presents better comfort than a non-integrated ceiling. Nocturnal ventilation could relieve heat stored during night hours but it does no clearly effect daytime heat storage in a typical brick wall.