1.1 Introduction

The term "passive" implies that energy-consuming mechanical components like pumps and fans are not used. To achieve thermal comfort in the summer in a more sustainable way, one should use the three-tier design approach. Passive cooling means using design choices to reduce heat gain and increase heat loss. Buildings, require some form of cooling at some time of the year to be comfortable. Passive cooling is especially useful in hot and humid or hot and dry climates. Passive cooling can significantly increase comfort and reduce energy bills.

It is best to use passive cooling design principles when building or buying a home. The main thing to decide is whether you will include any air-conditioning. In some climates, adding air-conditioning later may require fundamental changes to the home design.

Many aspects of the principles (for example, shading, increased insulation, and window design and placement) can be used in home renovations.

The main methods to reduce heat gain are to include good insulation levels, and shade windows and thermal mass in summer. The main methods to increase heat loss are to place and design openings to allow good ventilation, add ceiling fans or whole-of-house fans, and ensure any air-conditioning works well with building design and insulation. In climates with a temperature difference of 6°C or more between day and night, thermal mass can also be used to cool a home.

Landscape and garden design can also play an important role in passive cool