



16. Understanding passive solar design

Passive solar design is a combination of design elements that make an enormous difference to the comfort, energy efficiency, running costs and enjoyment of occupants over the life of a building.

Passive solar design involves using windows, walls, and floors to collect, store, and distribute heat in winter and keep it out in summer. Shading western walls and windows; orientation to the north, design of eaves; improved insulation and ventilation can make a significant difference in an existing building.

Getting started

If you are renovating or building, ensure passive solar design is taken seriously from the outset. If you are selecting a new building to rent, it is very useful to evaluate it from a passive design perspective.

Consult an experienced passive solar designer to ensure your individual needs are met.



How the principles of passive solar design are implemented will depend on your location and climate.

A well-designed and well-built passive solar building can massively reduce the need for active heating or cooling.

Principles of passive solar design

Orientate the building

Orientate the building to achieve maximum north-facing exposure, particularly for living and high use areas (elongated along the east–west axis).

Welcome the winter sun

Design the depth of the eaves to allow winter sun to shine directly into rooms, while excluding the harsh summer sun.

Have that winter sun heating a material with high thermal mass such as concrete, water or solid brick so it can slowly radiate heat during the night.

Shade walls and windows

Shade walls and windows from the summer sun – particularly on the north and western sides.

Insulate and seal

Have very good insulation and draught sealing in the roof, walls and the floor and between rooms.

Use thick curtains with pelmets to insulate windows. Some buildings use roof gardens or earth roofs to maximise insulation.

Reflect and double glaze

Design the windows to reflect or avoid summer sun, maximise winter light and heat. Double glazing can be cost effective for a new building or extension.

Let heat escape

Hot air rises so allow summer heat to escape passively through high windows that can be easily opened and closed.

Allow cross breezes for summer cooling when the outside temperature lowers or other well-placed opening windows

Select surfaces and textures that will absorb or reflect heat and light. For instance, a light coloured roof will reflect heat.

Use the right materials

The materials your building is constructed from have thermal mass, which will affect how quickly the space inside heats and cools. In some climates, using heavy construction materials with high thermal mass can save as much as 25 per cent on heating and cooling bills.

Shade and use vegetation

Use well-placed and suitable trees and plants to provide summer shading, winter light (e.g. deciduous species).

Star ratings for new buildings

The Building Code of Australia contains energy efficiency provisions that apply to all new residential and commercial buildings. Buildings receive a star rating and there are variations in the way that these are applied depending on your state.

Currently the highest minimum standard for new residential buildings in Australia



CHECK POINTS

- ▶ Insist on passive solar design being a specification for any renovation or new building.
- ▶ Get an architect or designer who understands the principles and has some experience of using them.
- ▶ Investigate how you could use the principles to improve the performance of a current building.

is 6 stars – however, research shows that building up to 7.5 stars and higher pays for itself in the form of lower energy costs. Similar results can be achieved for commercial buildings.

It is possible to build up to 10 stars – which results in a building that does not require heating or cooling.

Further resources

Check out A Greenhouse Around the Corner website:

www.agreenhouse.net.au/helpful-resources

Related fact sheets

For more fact sheets, go to A Greenhouse Around the Corner website:

www.agreenhouse.net.au/fact-sheets

