# Eaves in Canberra

## Introduction

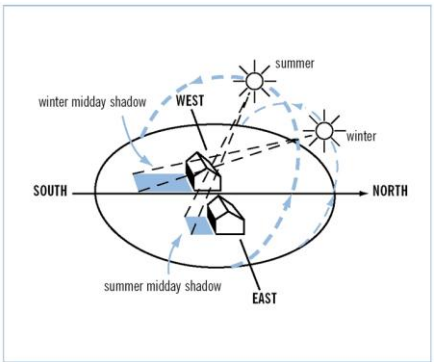
The eaves on your home have a dual purpose – to shelter walls/windows from the sun, and from the rain. To protect walls from rain, eaves with a minimum width of 400-600mm are recommended on all walls. However, the story is not so straightforward because the seasons present a challenge: in winter it is desirable to have sun falling on a dwelling's walls/windows (increases heat gain), while in summer it is preferable for the walls/windows to be shaded (reduces heat gain). To add complexity to the situation, the inclination of the sun in the sky varies both seasonally and during the course of the day. So, eaves are not as simple as they seem and deserve careful consideration in order to maximise their effectiveness.

The size of northern eaves is particularly important in Canberra because the winter here is relatively severe, but there is potential to use the sun to passively heat your home. In winter the sun is low in the northern sky (see diagram), but the wrong eaves can result in shading of northern windows and walls, a consequent reduction in heat gain to the dwelling and a decrease in its energy efficiency. Most of this fact sheet addresses the design of eaves for optimal sun performance.

## Southern eaves

Eaves on the southern face of your home provide some protection from Canberra's harsh winter weather, which often comes from the southwest. Eaves and plantings of vegetation on the southern side of the house can assist in somewhat reducing the effect of cold wind and rain on the southern walls/windows.

Direct sunlight does not shine on southern windows at all in winter, and barely touches them in summer, so southern eaves will not affect solar gain to the dwelling.




## East and West: eaves are not enough

Eaves alone will not adequately protect the eastern and western faces of your home from excessive heat gain during summer. The sun is high in the sky in summer (78.2° inclination from the horizontal at midday of the summer solstice, dropping north towards the horizon at about 7.8°/month), so the early-to-mid morning and mid-to-late afternoon sun will bypass most eaves and heat the house's eastern and western walls and windows.

Windows should be used sparingly on the eastern and western faces of a dwelling, and any existing east- and west-facing windows should be externally shaded in some manner. Some common external shading solutions include: blockout awnings, shutters, shade sails, pergolas/verandas and vegetation. While it is important to block the sun from the windows in summer, sun is desirable in winter, so optimally eastern and western shading should be seasonably adjustable.

## Northern eaves

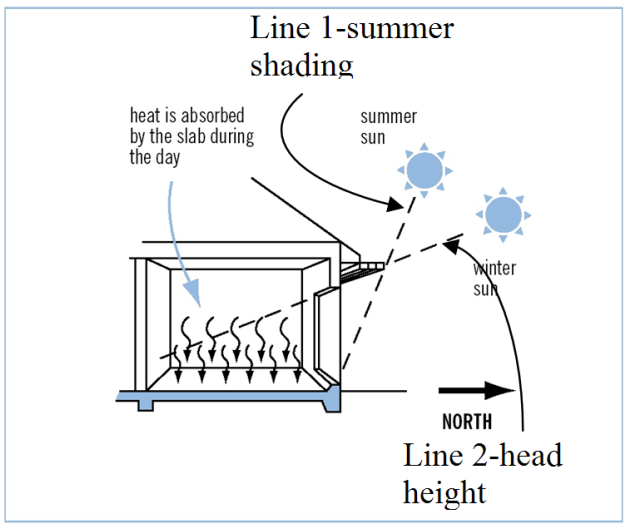
Eaves on the northern side of the home are often called 'solar eaves' because they must take into account the usefulness of the sun to passively heat the house in winter, while also accounting for the sun's detrimental heating of the house in summer.

On the winter solstice (June 20th-21st in the southern hemisphere), the sun rises and sets low in the northern sky – at midday on the winter solstice the sun reaches a maximum inclination of 31.2° from the horizontal. In fact, the sun is relatively low in the northern sky for all of the winter months. By contrast, as described above, the sun passes largely overhead for most of the summer months.

The sun's apparent movement, moving slowly towards the northern horizon as summer transitions to winter, makes a northern orientation (long axis of the house running east to west) a major advantage when it comes to passive solar heating in winter because it maximises the surface area of windows and walls facing in the direction of the sun at that time. A house with a northern orientation should also have an advantage keeping cool in summer because the most sun in summer will fall on the eastern and western faces of the house, which should have significantly less

surface area than the northern and southern faces, and will consequently gain less heat.
To maximise exposure to the sun in winter, a lack of eaves on the northern face of your home would be optimal. Conversely, in summer eaves are necessary to assist in shading the northern face of the house from excessive heat gain, particularly from late-January to March (Canberra's hottest months) as the sun's inclination falls towards the northern horizon.

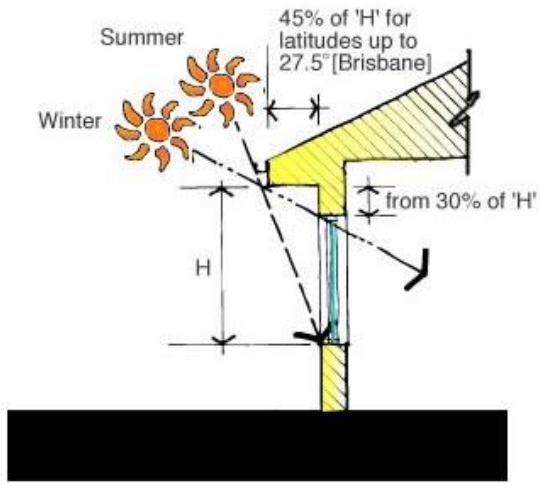
Therefore, the perfect eave for the northern face of a house in Canberra would be a retractable or removable eave that could completely block the sun from reaching the house in summer, but allow the sun full access for heat gain during winter.




## Working out a compromise

Since retractable or removable eaves are not standard and would probably be excessively costly to install, a 'solar compromise eave' width can be determined – one that blocks out most excess summer heat and lets in most winter gain.

Solar gain to your home is not desirable on the vast majority of days for roughly two months either side of the summer solstice (October 21/February 21). The angle of the sun at midday on these days is 62.6° inclination from the horizontal. So, a line drawn up from the bottom of any northern windows at an angle of roughly 62.6° inclination from the horizontal will provide a guide for an eave wide enough to block out direct sunlight for most of summer. Another line drawn from the underside of the eave back to the wall at 31.2° from the horizontal (the inclination of the sun at midday on the winter solstice) will provide a guide for the maximum desirable height of any northern windows so as to minimise heat loss from the window while still letting in the winter sun.




For most homes with standard ceiling heights and window sizes this results in a northern eave of 600-900mm. Don't forget to include the width of the gutter in these calculations.
Finally, it is worth noting that these calculation is based on a perfect northerly orientation, which is rare, and as the orientation of the house changes to the east and west, north-facing walls may require broader eaves, and north facing windows additional external shading.

## More information

This fact sheet is produced by the Home Energy Advice Team (HEAT) to provide you with some quick tips on cavity wall insulations.

If after reading it you would like more free information about this or any other topic to do with saving energy in your home, don't hesitate to contact us.