# Energy Efficiency

*Last updated December 2015*

CITY OF MARION

## Introduction

Houses built using energy efficient design principles cost little or no more to build, but cost much less to heat and cool compared with houses not built this way. In general, energy efficient homes need less heating and cooling as they take advantage of sun, shade and natural ventilation to stay comfortable inside.

This brochure has been prepared to explain Council's requirements for energy efficient housing.

## General principles for energy efficiency

Design principles for energy efficient houses are simple, and include:

- placing appropriate levels of insulation in ceilings and walls to keep in winter warmth and keep out summer heat;
- shading north facing windows to keep summer sun out but allow winter sun in;
- limiting the size, and/or appropriately shading, east and west facing windows which are harder to shade because early morning and late afternoon sun is at a low angle in the sky;
- designing a house layout to enable main living areas to be separately heated and cooled;
- Using solid materials, such as concrete floors and internal brickwork, to help even out temperature changes by taking up and letting go heat slowly; and
- Incorporating a roof pitch with a north orientation to accommodate solar hot water services and photovoltaic cells (solar panels).

Some of these principles relate to the design of a house (i.e. the room layout, and window size and location) while others relate to the construction of a house (insulation and materials of construction).

The Council will assess key design features of any proposed new house and additions as part of the Development Plan Consent (an assessment against the Marion Council Development Plan). Additionally, the Council or your Private Certifier will assess energy efficiency of any proposed new house and additions as part of the Building Rules Consent (an assessment against the Building Code of Australia or SA Housing Code).

## Council's Development Plan Requirements

When a Development Application is lodged with the Council to either build a new house or additions to an existing house, Council will make an assessment of the application against the policies in the Marion Council Development Plan.

The Development Plan stipulates that development should provide for efficient solar access to buildings and open space all year around.

Buildings should be sited and designed:

(a) to ensure adequate natural light and winter sunlight is available to the main activity areas of adjacent buildings

(b) so that open spaces associated with the main activity areas face north for exposure to winter sun.

Development should facilitate the efficient use of photovoltaic cells and solar hot water systems by:

(a) taking into account overshadowing from neighbouring buildings

(b) designing roof orientation and pitches to maximise exposure to direct sunlight.

## Building Code of Australia Requirements

The Building Code of Australia (BCA) requires all new houses and additions to meet minimum energy efficiency standards (e.g. a 6 star rating by the NatHERS or FirstRate rating system). To achieve the BCA requirements, new houses and additions will need to be appropriately designed (as described above) and constructed (e.g. using wall and ceiling insulation). For specific information on energy efficiency requirements, please refer to Part 3.12 of the BCA or Appendix H of the SA Housing Code.

## Helpful tips for achieving Council requirements & improving the energy efficiency of your home

### Location of rooms in the initial house design

It is particularly important to minimise the area of west facing glass due to the heat of late afternoon summer sun. Locating bedrooms and other rooms not used for day living along the western side of a house will help to achieve this.

Bedroom windows are typically quite small relative to the size of the room and they are frequently shaded for privacy reasons. Living areas, on the other hand, generally have larger window sizes. These rooms are therefore better located along the northern side of a house such that their windows face north rather than to the west.

## Shading windows

External shading methods (such as eaves, verandahs, awnings, etc) are more effective than internal shading methods (such as blinds, curtains and solar control films).

North-facing windows are the easiest to shade effectively. East and west windows can be difficult to shade as the sun is close to the horizon early and late in the day from these directions. South facing windows do not need shading, though they may need protection from wind and rain.

Wide verandahs are the most effective method to shade a west facing window, particularly where windows are large. For smaller windows, eaves and/or window awnings may be sufficient. There are many types and styles of awnings and shutters. They can be fixed or adjustable and they come in various materials.

Adjustable types are best as they can be closed to keep out direct sun and opened when the window is not affected by direct sun. Translucent materials such as acrylic and polycarbonate sheet will protect your house from rain and let in extra light, but may not provide effective shading.

## Carefully select your glass

A range of glass types have been developed specifically to reduce heat gain and heat loss, and save energy costs.

The U-Value is the rate of heat transfer through glass. The lower the U-value, the more effective the insulation of the glass and the lower the heat transfer through the glass, meaning more comfort and less energy required to heat your home.

The Shading Coefficient is a measure of the solar heat gain compared to ordinary clear glass (3mm). The lower the Shading Coefficient, the lower the rate of solar heat gain through your window, meaning more comfort and less energy for air conditioning.

Use of glass with a low Shading Coefficient can therefore significantly reduce heat gain through western windows on summer afternoons. Glass used in west-facing windows should have a Shading Coefficient no greater than 0.5.

Selection of glass types can also be affected by the window area and whether or not the glass is required to be "safety glass". Glass used in large windows can be extremely costly due to its required thickness, although it will not reduce summer heat load.

Where large window areas facing west are desired (to take advantage of coastal views for example) double glazing incorporating higher performing glass should be considered. Typically double glazed windows are comprised of 4-6mm glass sheets either side of a 12mm sealed air gap, and when combined with low-emissivity solar control* can result in a U-Value of 2.1 and Shading Coefficients of 0.35 - 0.5.

**Glass manufacturers now produce a range of glass types that have low-emissivity (Low-E) laminated solar control, however some Low-E glass types are only manufactured to a thickness suitable for smaller windows, and not the thicker glass types (e.g. 10mm plus) required for some large window areas.*

A major feature of double glazing incorporating Low-E and tinted (toned) glass is that approximately 60% of the sun heat can be reflected (compared to only 13% for 3mm clear glass), together with excellent heat retention in winter and significant reductions in external noise.

Additional reflection can be achieved by increasing the thickness of each pane. Solar film and reflective glass also reflect incoming heat and cut down the amount of light coming in. However, Council does not support the use of such films where reflectivity can cause loss of amenity to neighbouring residents or the general public. Also, solar film is not as useful in winter as it limits heat gain.

## What if there are views to the west?

In some locations residents may want large windows facing west in order to enjoy an attractive view or to open up a view to an outdoor garden area. In such cases it will be necessary to ensure that increased shading is provided in the form of verandahs or wide eaves / window awnings, and that the glass type is selected to minimise heat gain and heat loss.

For example, where the total glazed area exceeds 35% of the floor area of a room, double glazing will be required together with wider shading devices.

### What if the windows are shaded by existing structures?

In many cases west facing windows may be partially shaded by neighbouring houses, fences or other structures, particularly in the late afternoon. In such situations the width of shading devices can be reduced, although special glazing may still be required.

### Landscaping

In situations where retention of a view is not important, additional landscaping of suitable species may be used to reduce heat gain into west facing windows in the late afternoon.

### Orientation of windows

Changing the orientation of west facing windows can help. For example, a minor change to a north-west orientation can reduce the heat load in late afternoon and reduce the extent of shading required.

### Internal shading

Close fitting curtains with sealed pelmets are the most effective internal method of shading to prevent extra heat gain in summer and reduce heat loss in winter. Holland blinds, curtains without pelmets and vertical drapes will provide some shading but are less effective than curtains with pelmets.

## Other Information

Further information on energy saving techniques is available through the Advisory Centre of Energy SA, located on the ground floor at 101 Grenfell Street, Adelaide.

Applicants can also ask their builders and architects/designers for further information, or glass and window manufacturers can provide detailed advice on the preferred window/glazing types appropriate for each situation.

## Want to Know More?

The above information is advisory only. It is intended to provide a guide and a general understanding of the key points associated with the particular topic. It is not a substitute for reading the relevant legislation or the Development Plan.

It is recommended that if you are intending to undertake development, you seek professional advice or contact the Council for any specific enquiries or for further assistance concerning the use and development of land.

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