10 Tips

For Energy Efficient Home Design

Energy efficiency and sustainability are now everyday phrases in Australian lifestyle. These are never more important than when you think of building. There is an opportunity to dramatically reduce energy usage with correct planning.

There is no readymade “floor plan” that will suit all scenarios. An energy efficient home design can only be achieved by careful consideration of key elements such as the site, the surrounding environment and local weather patterns. The best way to achieve this is to plan ahead with the individual site in mind, and to take into account the following points.

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1 Orientation

In a well-designed house there should be no need to turn on the lights in the living areas during the day. To achieve this, living areas should be north facing with appropriately sized windows that let in plenty of natural light. In conjunction with appropriately designed shading (eaves and awnings), this provides the added benefit of allowing warm winter sun to enter the house on those cool winter days. Clever orientation will channel cool breezes through your home whilst blocking strong wind and harsh weather.

This design allowed the warming sun into the house during winter, whilst also protecting from the hotter sun in summer, creating comfortable outdoor living all year round.

2 Microclimate

Even within a short distance, two building sites may vary dramatically in regards to their specific climate. Capturing local breezes when building on top of a ridge can mean considerable design differences when compared to a home down in a valley surrounded by dense forest. Is the west protected by a hill, or is the northern aspect blocked by trees? Specific details of the site need to be considered early on.

A coastal property will have different weather to an inner city suburban home, and as such a customised plan should be developed to get the best from the climate and local environment.

In this design the surrounding hedging and pool created its own microclimate, creating a shield from the harsher coastal breezes of the area.

3 Protected Outdoor Living

In Queensland's sub-tropical climate, a well-designed and connected outdoor space is a crucial part of any modern home. Orientated correctly for winter sun, but protected from the summer heat, this space can be used in all seasons. Think of the space as another room of the house, but with a more direct connection to the landscape.

Consideration should also be given to the usual direction of inclement weather. Careful positioning of blade walls, internal corners and strategic rooflines can increase the comfort and usefulness of the space. Ensuring that this outdoor living area has the same floor level as the inside living also helps to integrate both spaces.

Prioritise your planning around a well-designed outdoor living area that takes advantage of all the best aspects of your land.

4 Site Sensitive Planning

Whether the site is a small inner city allotment or a sprawling panoramic acreage, the way the home connects and nestles in with the landscape contributes significantly to the lifestyle enjoyed by the residents.
Consideration of existing vegetation, distant views, nearby waterways and the natural contour should enhance the design process and result in a far superior residence.
In highly populated areas, it's also important to think about neighbours sight lines and overall privacy. Treading lightly on the earth should always be a priority, so as to integrate the house with the natural contours of the land and control site costs.

Careful consideration of the sites natural features will enhance the design.

5 Ventilation and windows

In a humid climate like we have here in SE Queensland, the most effective way to keep cool is through good cross ventilation and air movement. With carefully planned placement of openings, you can increase the speed of air movement throughout your house and maximise the cooling effect. Prevailing winds change through each season and cause positive and negative pressures to be exerted on windows and external walls. A good understanding of these principles is important to achieve the best design solution and thermal performance.

Choose an architect with the experience and expertise to provide planning solutions that give you greater control over your microclimate and maximise the available cross ventilation in summer months. While louvres are expensive and not everyone's preferred window type, locating just one or two louvres in strategic locations can give you full control over the amount of breeze through your home.

High and low windows provide privacy while allowing good air flow and escape of rising warm air in Summer

Mechanical ventilation provided by ceiling fans is also highly recommended as the fans will boost air movement on still days and nights and reduce the use of air conditioning.

Window size and location also has a significant impact on your energy efficiency rating. In Queensland you want to reduce direct sun on large expanses of glass throughout the summer months and still allow for winter sun to reach your living areas. This can be achieved using deep eaves of 750mm or greater over your windows and by using highlight windows to pick up northern winter sun angles.

6 Insulation

High levels of insulation in roof spaces and external walls will provide maximum protection against heat loss and heat gain throughout the year and reduce your heating and cooling costs. Ceilings alone can account for up to 35% of heat loss in winter, so it's best to include at least R2.5 insulation to all your internal ceilings. In addition, an 'Anticon Blanket' should be fitted to the entire rake of the roof, directly under the roof sheeting.

This 60mm thick insulation blanket has reflective foil on one side to assist in the management of condensation in the roof space. Floors and walls are also vulnerable to heat loss and gain, so it's best to choose materials and insulation options that have been well researched and tested. Ideally these should be considered right from the start of the design process.

Anticon blanket also reduces the noise levels of heavy rain so prominent in SE Queensland.

7 Landscaping for Climate Control

The immediate surroundings of your home can greatly influence the comfort level inside, so both 'soft' and 'hard' landscaping should be considered carefully. Too much heavy paving in the wrong location can increase hot air coming into the house. It can also create unwanted glare.

Instead why not think about screening hedges and plantings that can protect you from southerly wind and weather. Well-located deciduous trees can also complement the house perfectly, allowing winter sun in and providing cooling shade in summer. Once again, landscaping options should be on the agenda at the design stage and the services of a contemporary landscaping designer be considered.

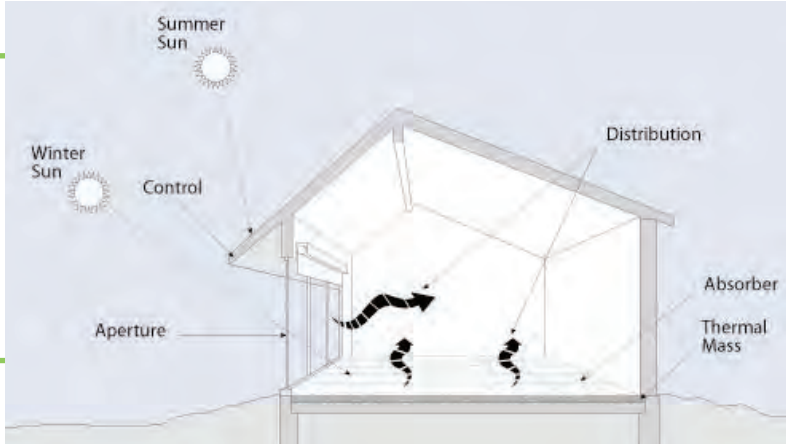
A well thought out landscape design can enhance the comfort inside and outside your home.

8 Thermal Mass

This is the ability of the mass of a building (or part thereof) to absorb heat. When outside temperatures are fluctuating throughout the day, a large thermal mass within the house can serve to "flatten out" the temperature fluctuations. The thermal mass might be an internal stone feature that is heated by morning winter sun and releases that warmth throughout the cooler evening. This can also work to help cool a space as a large thermal mass will take ambient heat from the air.

The material used needs to be dense like concrete, brick or stone preferably of a dark colour which is more effective. Thermal mass can be a great companion to thoughtful design and insulation, however, incorrectly designed or positioned thermal mass can be disastrous and actually work against the liveability of the home.

Consider the materials used for thermal mass storage, tiled floors on concrete slabs are very efficient at storing the heat during warm winter days and releasing it during the cooler evening.



9 Power Conservation

Embrace natural light. Using natural light whenever possible instead of relying on artificial light can greatly reduce the amount of electricity you use during the day. Exposure to natural light also increases our enjoyment of the home.

With today's utility prices continually increasing, more than ever, consideration is being given to power conservation at a planning stage. As always, high star-rated appliances and efficient LED lighting will lower a home's power consumption. Building regulations now insist on energy efficient water heating methods like solar, gas or heat pump systems. But make no mistake - all of these are no substitute for a carefully planned site-specific structure.

Much of what has been previously outlined such as orientation, ventilation and insulation all play a crucial role in controlling power consumption. The goal of a well-designed home is to minimise the need for artificial cooling and warming, plus maximise natural light.

10 Water conservation

Harvesting rainwater can also be used on the garden, further saving water and money.

The large roof runs on modern designs are excellent for rainwater harvesting. A good design will include ample guttering to account for this water volume, along with rain water heads and first flush systems. There are many different styles of efficient water storage tanks available. They should always be designed specifically for the site and water requirements of the household.

Inside the home, highly efficient plumbing fixtures reduce the homes' water usage. There are also popular plumbing systems that can take rainwater from a tank for use in the laundry, WCs and external taps even when the home is on mains water.

The end for poorly designed new homes is near.

Gone are the days of the McMansion status symbol of a big, inefficient box with more rooms than you know what to do with and none of them taking into account the aspect, orientation or benefits of its location.
Project homes with generic plans put little or no emphasis on the 10 points outlined above. This lack of site-specific design solutions means that they have to be mechanically heated and cooled and artificially lit, making a house incredibly energy hungry and costly to run.

With the costs of power and water supply tipped to be the biggest household cost after the mortgage in years to come, the end for poorly designed new homes is near. In fact the resale market is already seeing favourable sale prices for energy efficient homes compared to those that are poorly designed.

So, a bit of thought and implementation of the above points go together to make a home energy efficient. Above all, it will make it a truly liveable home from the day you move in. It all starts with the site inspection.

Site inspections are crucial to gain an understanding of factors that will effect the design process

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