

# Discover How Smart Design Leads to Big Savings and a Livable Home



# The Key to Designing a Better Home

The design stage of a new build or renovation is the most important step when building. By incorporating key design principles in a floor plan, to suit your specific block, we can enhance your lifestyle and well-being.

This must be part of a well-considered holistic design approach. I consider this approach to be crucial when designing a new home or renovation.

– *Rusty Hinge  
Home Design*





## DESIGNING FOR CLIMATE

A large part of good design is designing a home to work with the local climate. This reduces the need for additional energy sources to heat and cool your home.

It is important to keep in mind, that the home occupants also have a role to play.

By adopting good habits, they can allow the home to absorb heat during the colder seasons and achieve a cooler atmosphere in the hotter months. This can be as simple as opening curtains during the day in winter or opening windows in key areas during summer evenings.



## PASSIVE DESIGN

Passive Design incorporates many different aspects of the building and the environment around it. Building orientation, thermal mass, glazing, insulation, room location etc all work together to provide more comfortable homes.

Many aspects of passive design can usually be incorporated at little or no extra cost yet give so much back to occupants.





## SOLAR ACCESS

This is the term used to describe the amount of sunshine reaching living spaces through glazing. Where we live, on the south coast of NSW, the aim is to restrict the sun from entering inside in summer and allow it to penetrate during winter.

Solar access forms part of the passive design process. In winter, when the sun angles are lower, heat enters through the windows. This heat is then absorbed by the building structure and the furnishings, then re-radiated as longwave radiation which does not pass back through the glass as easily.



## ORIENTATION

A considered orientation of a home on a site allows the home to be more comfortable and decreases the need for additional heating and cooling requirements. The sun path during winter and summer is considered when correctly orientating a building on a site.

Although not as hot, the North side (internal rooms) of a home receives more solar radiation on a winter's day than on a summer's day. This is due to the sun's path/angle (or arc) in winter being much lower in the sky.



## FLOOR PLAN – NORTH WINS!

The north-facing side of a home where we live on the south coast of NSW is considered to be the most ideal aspect. This is where we need our lounge, living and dining rooms to take advantage of the best solar aspect.

In most cases, if not all, the land, orientation and solar aspect must determine the basis of a floor plan layout. This is something that is usually not fully understood by many. Yes, we can move things a little here and there for views, for example, however, there will be trade-offs elsewhere.

Almost everyone has lived in a home where the key aspects have been ignored and have experienced the effects.

Homes with sprawling floor plans, and incorrect room and window placement, for example, add unnecessarily to the 'workload' of a building. For most, the 'solution' is to switch on the air con. Consequently, it's little wonder some struggle to embrace the need for better-designed homes.





## ROOM SIZES

Australian home sizes have increased steadily. Many rooms in our homes are excessively large or rarely used. Sure, it's convenient to have additional space but this does impact not only our ongoing energy use but also our initial build cost and ultimately, our mortgage.

We need to rethink what we actually 'need' as opposed to 'want'. Can an extra lounge room also be a temporary guest bedroom with fold-down bed or study for instance?



## SOLAR SHADING

By shading the external walls and windows, we can reduce the impacts of summer temperatures, reduce energy use, and improve occupants' comfort.

Shading types/methods, vary depending on the orientation of the building, the climate, and which side the house is facing.





## COLOURS

Roof colours in particular are extremely important. Where we live on the south coast of NSW, a dark colour roof is not ideal. These colours heat up our homes and require additional energy and insulation etc to help combat the effects.

The same can be said for dark external walls. Lighter colour roofs perform much better and should always be the first consideration.



## ZONING/LAYOUT

Determining the ideal zoning (or layout) of rooms takes place after we've visited the site, and a Site Analysis has been carried out. This will highlight existing features on the site such as views, prevailing winds, shading issues, points of access, sun paths, possible noise issues from surrounding homes etc.

From this, along with the survey plan, and the true north point, the rooms and uses of a building can begin to be positioned according to good practices of passive solar design.



## THERMAL MASS

Materials such as concrete, bricks, stone, tiles, and even water when used correctly, have a high thermal mass. Products with a high thermal mass absorb heat from the sun during the day (and internal heating at night), then release the heat energy at night.

This results in more consistent temperatures throughout a 24hr cycle. Occupants' comfort levels are increased, and energy costs are lowered.





## FLOOR COVERINGS

If our floor coverings are similar to the thermal mass materials above, this is ideal. Floor finishes such as carpet and engineered floorboards applied over a concrete slab, do reduce the efficacy of thermal mass considerably.

Keep in mind, that carpet is still ok in bedrooms for example where we are not relying on thermal mass (i.e. on the south side of the house).



## INSULATION

Insulation acts as a barrier to form a 'shell' at the perimeter of the building (roof, walls, floors). This barrier reduces (Insulation must not be viewed as a one-stop solution) the amount of heat either exiting or entering the home's shell.

This also allows occupants to make adjustments, to control temperatures within the home by using windows, curtains etc to change and enhance internal conditions.





## GLAZING

Windows, or more specifically glazing, has come a long way in a short space of time. Energy efficiency in glazing is a high priority, and for a very good reason. A considerable amount of heat energy can be lost, and gained through windows!

Windows are considered to be a weak point in the main house thermal barrier. The key concept of glazing is to maximise glazing in the north with considered shading, reduce glazing in the east and west with considered shading, and minimise glazing in the south.



## HEATING AND COOLING

Currently, the average house-holds energy used for heating and cooling is around 40% of the total energy used in a home! To reduce the energy loads, use air conditioning for example only in living areas.

Ceiling fans in the living areas and bedrooms are also an efficient way to cool. New homes are warmer in winter and cooler in summer no doubt compared to the home you're in now.



## APPLIANCES

This is the next biggest area of energy use. Appliances account for around one-third of the energy used, and almost half of household greenhouse gas emissions!

To reduce environmental impacts, we now move away from gas stoves for example, and instead use induction cooktops. By using induction cooktops, and sourcing electricity from Photovoltaic (P.V.) solar panels on the roof we can all do our bit.





## HOT WATER

Another big user of energy in the home is hot water at around 21% of the energy used in the average home. With the move away from gas appliances and heating due to its negative impacts on the environment, we look at cleaner alternatives.

Electric Heat pumps and electric-boosted solar hot water are ideal choices for most homes and even better when combined with Photovoltaic (P.V.) solar systems.



## PHOTOVOLTAIC (P.V.) SOLAR ELECTRICITY SYSTEMS

By converting solar energy into electricity, we can reduce energy costs. Photovoltaic (P.V.) solar systems capture sunlight via panels placed usually on north-facing roofs, then send this energy either back into the electricity grid, directly back into the home, and more recently, on-site battery storage.





# LIGHTING

Energy-efficient lighting such as LED combined with the correct mounting options (such as surface mount ceiling lights to allow continuous insulation at ceilings) are a must. Recessed downlights are to be avoided as the ceiling insulation cannot usually be continuous for most downlights.



## WATER USE

Above the ground, we rely on water sources such as rivers, lakes, dams, tanks, and below-ground aquifers such as wells and bores. We can all play a part in reducing water use at home. High-star rating tapware, shower heads, dishwashers, washing machines and toilets reduce water usage. The way we use these items has a dramatic impact too.

The roofs of our homes are perfect areas to catch rainwater. Diverting rainwater via roof gutters and downpipes to rainwater storage tanks just makes so much sense. Although drinking water in suburban homes should be via town mains supply, there is no reason we can't use the rainwater we collect for other uses around the home. Typical uses are for gardens, toilets and washing machines.



## EXTERNAL HARD SURFACES

Areas such as driveways and well-used paths need to be hard-wearing to avoid erosion, but not necessarily concrete. Permeable surfaces such as gravel, or paving allow water to pass through them which can be absorbed into the existing subsurface soil.

This method continually 'tops up' the groundwater supply, rather than possibly diverting it directly from a hard surface such as concrete, to a stormwater drain.

# SUMMARY

- ✓ Designing for Climate- We need to work with the local climate.
- ✓ Passive Design- So much comfort, for little effort.
- ✓ Solar access- Minimise sun inside in summer and allow it to penetrate during winter.
- ✓ Orientation- The sun's path/angle (or arc) is high in summer, and lower in winter.
- ✓ Floor Plan - North wins!- Use the best solar aspect. Lounge, living and dining rooms at the north.
- ✓ Room Sizes- Do we really need it, or do we just want it? Can we change our perspective?
- ✓ Solar Shading- Shading needs to be considered carefully.
- ✓ Colours- Lighter roofs will give us the best chance of achieving a 7-Star home.
- ✓ Zoning/Layout- Position rooms where they need to be.
- ✓ Thermal mass- Used correctly can be 'free' heating and cooling.
- ✓ Floor Coverings- Understand thermal mass, and you will understand floor coverings...
- ✓ Insulation- Insulation is only part of building a more comfortable home.
- ✓ Glazing- North-Maximise glazing, East & West-Reduce glazing, South-Minimise glazing.
- ✓ Heating & Cooling- Ceiling fans & air conditioning only in living areas. Ceiling fans bedrooms.
- ✓ Appliances- No gas cooktops, use induction.
- ✓ Hot water- Electric Heat pumps and electric boosted solar hot water are ideal choices (not gas).
- ✓ Photovoltaic (P.V.) solar electricity systems- The roof shape & location is essential for efficiency.
- ✓ Lighting- Avoid downlights for continuous ceiling insulation.
- ✓ Water Use- Maximise water storage, select efficient products and minimise usage.
- ✓ External Hard Surfaces- Minimise hard surfaces such as concrete paths.



# **Creating Homes for Living, Loving, and Thriving.**



*For me, designing a better home,  
just makes so much sense.*

If you found the information helpful,  
and are planning on designing a home  
in the Milton, Ulladulla, Mollymook,  
Manyana, Bawley point area, please  
give me a call.

*Adam Smith*

Building Designer  
Rusty Hinge Home Design  
[info@rustyhinge.com.au](mailto:info@rustyhinge.com.au)

© copyright 2023 Rusty Hinge Home Design