

# BUILT FOR COMFORT



Your guide to building your new home or retrofitting your existing home in Camden's climate.



Improves thermal comfort



Increases the value of your property



Better for the environment



A quieter home



Cheaper to operate



Improves resilience



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# INTRODUCTION

## Why build smart for the future?

Planning a smart home is planning for your future. Buying or building a home can be one of the biggest financial investments that people make, so it's important to get it right from the start. Often, we don't consider how the decisions we make will impact on how comfortable our new home is or how much it will cost to run.

In NSW, all new homes and major renovations must complete a sustainability assessment to obtain a Building Sustainability Index (BASIX) certificate. This certificate outlines the commitments made in relation to energy, water and thermal comfort requirements to meet the NSW Governments minimum standard for an energy and water efficient home. However, doing more will really pay off in the long run!

With a shifting climate, it's important to design your home to meet today's needs but it's also important your home is efficient and comfortable in 30 years' time. By choosing to exceed the minimum standards of BASIX and applying simple and sustainable passive design principles, you can create a year-round comfortable home while saving energy, water and money.

Whether you are buying off the plan, custom designing your new home or undertaking renovations, this booklet will provide you with simple tips to improve the liveability and comfort of your home.

## How to select a builder

Selecting a builder is a key decision and one that shouldn't be taken lightly. Often people shortlist builders they are familiar with or that they have heard about through word of mouth. However there is so much more to consider if you want a home that is comfortable year-round and cheaper to operate.

It is not essential to select a 'green' builder as the information provided in this guide can easily be transferred and used by your builder or designer, but it is important that your builder is willing to work with you to ensure your home is built for comfort.

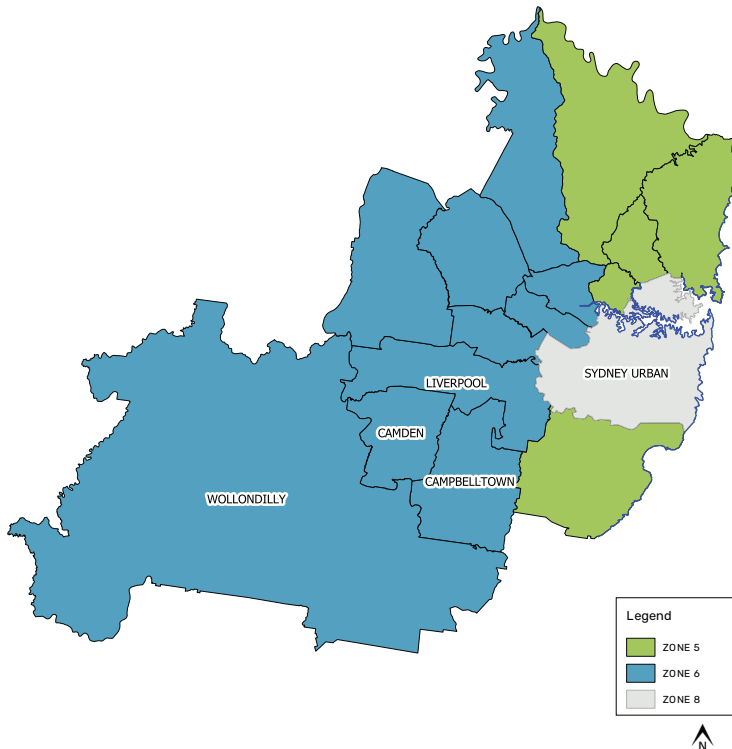
For further information on selecting your builder review the checklist on page 29.



# DESIGNING FOR THE LOCAL CLIMATE

Integrating the local climatic conditions into the design phase of your project will deliver a more comfortable home for your family. Given the changing climate, it is also important your home is climate responsive and has been designed to be resilient to changes in the climate in the coming years.

The *Building Code of Australia* has identified eight climate zones that characterise the level of sunshine, wind, humidity, rainfall and temperature of a region. The zones for Sydney are shown in Figure 1.



**Figure 1** – Climatic zones for Sydney. Source: Camden Council

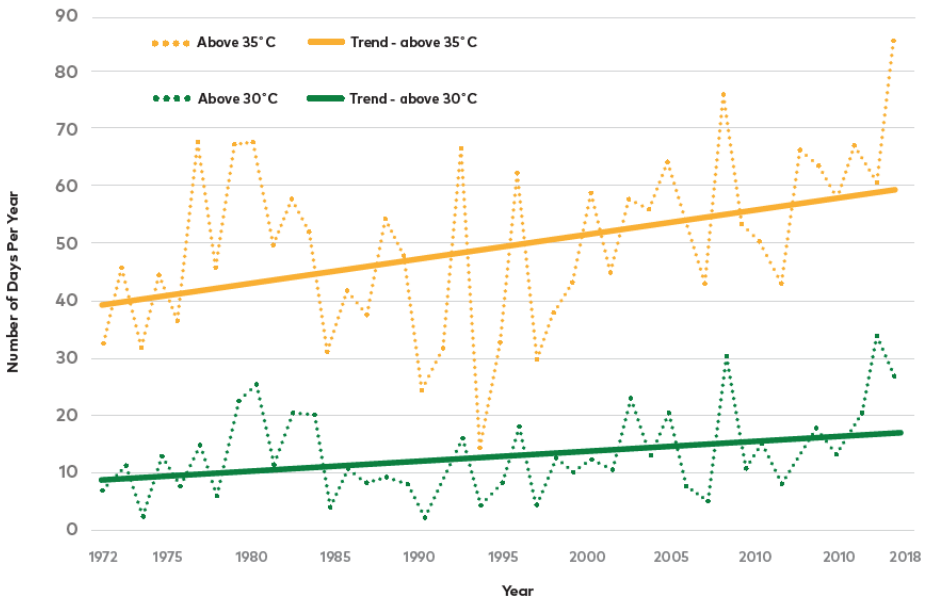




The Camden region is classified as **Zone 6**, and is characterised by mild, temperate weather patterns with four distinct seasons. The key things to consider for this zone are mild to cool winters with low humidity, and hot to very hot summers with moderate humidity. Due to the specific climatic features of the Camden region, the main design objectives for homes are to:

1. Reduce extreme temperatures affecting the ambient temperature of the home; and
2. Reduce reliance on auxiliary heating and cooling systems.

It's also important to remember that our climate is changing. In the coming years, Camden is likely to experience higher temperatures, fewer frosts, altered rainfall patterns, and changes in the frequency and intensity of natural hazards like bushfires, flooding and heatwaves. As an example, Figure 2 shows the increase in the number of hot days already experienced in the local area, so it makes sense to ensure that your new home, or changes to your existing home have been designed with these very hot days in mind.



**Figure 2** – Number of days in the Camden area above 30 degrees Celsius and 35 degrees Celsius. Source: Camden Council LSPS

## Passive design

A passively designed home sounds complicated, but they are really just homes that use design principles that work with local climate conditions, not against them to create a consistent and comfortable temperature in the home. This is achieved by optimising use of the sun and wind to provide natural and free cooling, heating, lighting and ventilation.

By incorporating some or all elements of a passive house you can create a home that is more **energy efficient, functional, comfortable, healthier** and **resilient**.

## Benefits of a passive designed home

- ✓ Affordable to operate – lower heating and cooling costs;
- ✓ Improves comfort – consistent temperature in the home throughout the year;
- ✓ Increases the value of your property;
- ✓ Better for the environment – reduced emissions;
- ✓ Quieter – insulation, window quality and draught proofing eliminates a lot of outdoor noise' and
- ✓ Improves resilience – at times of power outages the home will remain comfortable without the need for heating and cooling.

## Key passive design elements to consider in the design of your home include:

### » BLOCK SELECTION

When looking for a possible building site think about the features and whether heating or cooling will be the primary requirement. Consider existing trees and future buildings on neighbouring properties as these can have a significant impact by limiting ventilation and providing shadowing on living areas and solar photovoltaic panels.

## » ORIENTATION

Ensuring the orientation of your house on your block has been optimised can have one of the greatest impacts on the thermal comfort of your home and significantly reduce household energy bills.

The most important parts of the house to think about are the living areas, as this is where you and your family will spend most of your time. The site layout should take advantage of the sun and prevailing winds as it will provide natural light, heating and cooling and possibly power to your home. A north-facing home will allow for passive solar heating, especially in winter, as there is greater solar radiation on north facing walls and windows at this time of year.

## » ROOM LAYOUT

Room layout can have a powerful impact on the thermal comfort of your home. Heat distribution is affected by the layout and arrangement of rooms, for example the western façade of a home will receive the hottest and maximum amount of sun radiation, experiencing the greatest amount of heat gain.

**Tip: Minimise external West and East facing wall areas**

### What goes where?

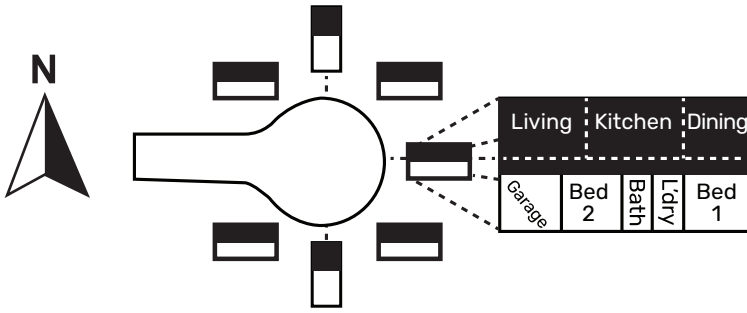
**Northern side** – the most actively used living areas should be located on the northerly side of your home to take advantage of the winter warmth and natural light, and to minimise heat gain from exposure to strong afternoon sun.

**Southern side** – best suited for rooms that do not require heating, such as bathrooms, laundry and guest rooms.

**Eastern side** – best suited for bedrooms due the natural light of the morning sun. This side also provides a cooler sleeping space by avoiding the strong afternoon sun.

**Western side** – this is the hottest area of the house with the largest temperature fluctuations due to the impact of strong afternoon sun. Garages and minimally used rooms are best suited for this area and the use of windows should be minimised.

See Figure 3 for a visual representation of suggested layouts.



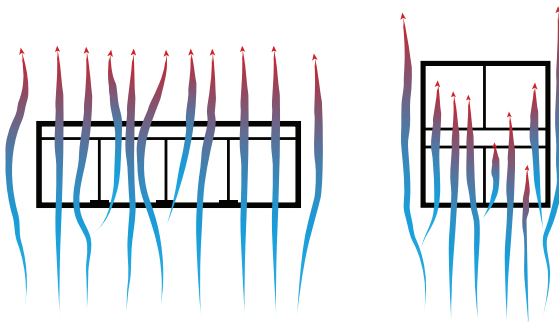
**Figure 3** – Layout of home living areas based on block orientation. Source: Your Home.

## » CROSS VENTILATION

Taking advantage of summer breezes can achieve cooling comfort in a home and reduce reliance on mechanical cooling once the heat of the day has passed. Best of all, it is natural and free. Cross ventilation allows air to enter through an opening and flow directly through the home, exiting from an opening on the other side of the home.

Cross ventilation works when the air temperature outside the home is cooler than the inside temperature and is most effective in narrow and open planned homes as shown in Figure 4

**Tip:** Homes that are narrow and have an open plan will achieve greater benefits from cross-ventilation.



**Figure 4** – Effectiveness of cross ventilation in open planned and narrow homes. Source: Your Home.

Important things to think about to maximise the benefits of cross ventilation, include the placement and size of windows and whether they are able to be opened enough to allow effective ventilation. The direction of dominant breezes, particularly in summer, for your location should also be considered to maximise the benefits.

**Tip: Plan for more windows on the northern and eastern faces of your home to optimise solar gain. Homes with a lot of windows on the south side of a home are harder to heat, while those with windows on the west can be harder to cool.**

## » WINDOWS

Window selection is critical in maintaining a comfortable home as up to 40 per cent of a homes' heating energy can be lost and up to 87 per cent of its heat gained through windows ([www.yourhome.gov.au](http://www.yourhome.gov.au)).

Windows provide an opportunity for natural light and warmth to enter the home and provide an important connection to the outdoors.

Site specific consideration should be applied to the selection and location of windows and glazing systems as there are no "one type fits all" solution. An energy efficient glazing system can dramatically lower energy use within the home and save you money.

Heat is gained through windows in one of two ways. The first is directly from the sun, while the second is conductive heat, which is based on the outdoor temperature compared to the indoor temperature. Two measures are used to describe the performance of windows:

**Solar Heat Gain Coefficient** (SHGC) – measures the amount of heat that will be gained directly from the sun shining onto the windows. The lower the SHGC the better the insulation properties of the window; and

**U Value** – measures the amount of heat that will be conducted through your window, either from inside to outside or outside to inside depending on the difference in temperatures. The lower the U Value the better the insulation properties of the window.

These measures are affected by the type of glazing in the windows, which can include low emissivity glass (Low-e glass), the use of double glazing, tinted or

toned glass and films. The material used for the window frame should also be considered. General advice for the Camden area is for the use of low U value glazing, with the SHGC dependent on the orientation of the windows. Windows facing south and west should generally have a low SHGC, while it may be appropriate for north facing windows to have a higher SHGC.

Window selection should be based on your individual location and house design. Things that you and your builder should think about include:

- Local climate conditions;
- Window size and location, and how the window opens;
- The thermal properties of different glazing systems;
- Building orientation and room layout; and
- Building materials used, such as insulation values and building mass.

## » EXTERNAL SHADING

When building or renovating your home, simple design features can help maintain a comfortable temperature inside and reduce running costs by reducing the reliance on artificial cooling systems.

Simple solutions such as the use of eaves, pergolas, awnings, shutters, blinds and even screening plants will assist to regulate the amount of solar access admitted into your home, particularly on the western facade. Eaves that are appropriately designed will reduce summer sun while allowing winter sun to warm the home.

## » THERMAL MASS, INSULATION AND ROOF COLOUR

All materials have different thermal properties, so the building materials you select for your new home or renovation will make a big difference to the effectiveness of the insulation and overall energy efficiency of the home.

**Fact: 90 per cent of heat gain can be eliminated by using efficient shading techniques.** Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)

### *Thermal Mass*

Thermal mass is the power of a material to absorb, store and then release gained heat. High thermal mass materials, such as concrete, brick and tiles, require a lot of heat energy to change their temperature.

Heat can quickly build up inside a home as air absorbs heat energy and changes temperature quickly. Using high thermal mass materials strategically can help to

moderate indoor temperatures. For example, during summer these materials store heat during the day and release it overnight. Thermal mass is most effective where there is a big temperature difference between day and night.

Careful material selection is required, as it can slow the rate of heating and should be used in consideration with insulation and passive design for optimum results. As all building materials contain different thermal masses, appropriate selection of materials can make a positive impact on the thermal comfort and performance of the home.

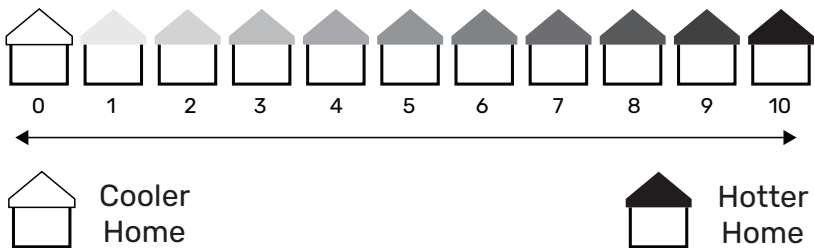
**Tip: Thermal mass should be situated to absorb the winter sun whilst limiting access to the summer sun.**

### Roof colour and treatments

In addition to thermal mass and insulation, roof colour can have a considerable impact on the thermal comfort of your home.

Roofing materials vary in their level of solar absorptance, expressed as a solar absorptance value. The lower the number the more heat that is reflected and the less heat that is absorbed. Generally, this reflects the colour of roofing, with lighter coloured roofing have lower solar absorptance.

### IMPACT OF ROOF COLOUR ON HEAT ABSORPTION



Heat loading can be dramatically reduced with a lighter roof colour and can result in significant temperature reductions, which is important in areas like Camden where a large number of very hot days are experienced. Alternatively, a range of roofing products are also available with reflective roof coatings which prevent heat being absorbed.

## Insulation

Insulation is one of the most important considerations for a thermally comfortable and energy efficient home, with potential cost savings of up to 45 per cent (Source: Sustainability.vic.gov.au).

All materials allow the transfer of heat. Insulation provides resistance to heat gain and losses in and out of the home as shown in Figure 5, safeguarding your home from drastic changes in the weather. Most building products have low insulation values so additional insulation is needed.

For best results, compare the "R" values as this is a measure of resistance to heat transfer. The higher the "R" value the better the performance of the insulation.

Insulation can be applied during building or renovations to the walls, ceilings and floors and climate variations must be considered when selecting the level of insulation that is appropriate. The type of insulation selected will depend on whether you need to keep heat in, keep heat out, or a bit of both.

**Tip: Insulation must address temperature fluctuation experienced on a daily and seasonal basis.**

Because of the local climate the focus in the Camden area should be on both keeping heat out during summer and keeping heat in during winter. General insulation requirements for the Camden region include the use of bulk and reflective ceiling and wall insulation, and insulation of the floor if it is elevated.

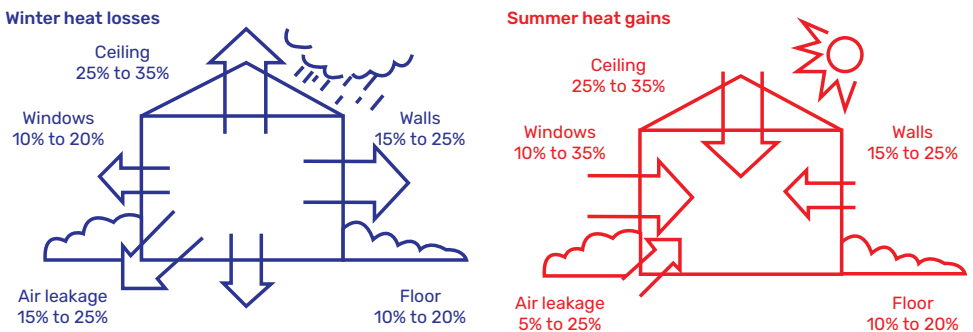


Figure 5 – Winter and summer heat losses and gains. Source: SEAV 2002

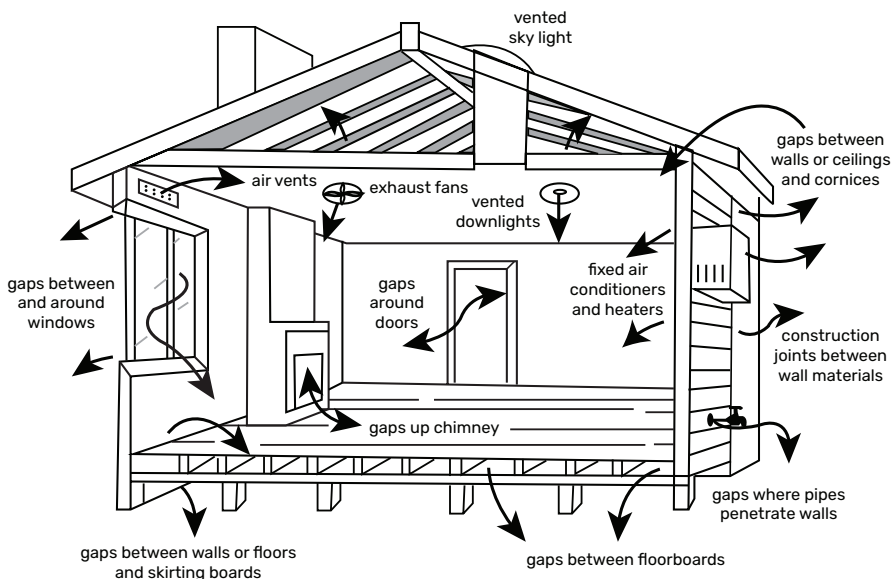


## » SEALING YOUR HOME

Heat loss occurs when air leaks through the walls, windows and doors, compromising the energy efficiency of your home.

Leaky homes are difficult to heat and difficult to cool. Creating an airtight home is one of the easiest ways to improve the comfort of your home and reduce your energy bills.

**Fact: Sealing your home can prevent 15 to 25 per cent of winter heat loss.** Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)



**Figure 6** – Common air leakage points in homes. Source: SEAV 2002

There are a number of ways to keep your house sealed. During construction, ensure that joints between different materials, for example walls and ceilings, are sealed before fixing. Consider the use of airlocks to prevent air entry to your home and ensure that windows and doors have tight air seals. There are also a wide range of draught-seal products for windows and doors available commercially that can be installed at any time.



# ENERGY

The amount of energy used in your home is directly affected by the selections you make when designing your home and also in how you use your home on a daily basis. You can have a big impact on the ongoing cost of running your home when making decisions around the types of materials and appliances used in your home, and even the design and layout of our homes.

Where we use energy in our homes is also important. In the average home most energy is used for heating and cooling, followed closely by our appliances and fixtures. Hot water systems are also large consumers, with lighting having a smaller impact on the overall energy use.

## » RENEWABLE ENERGY

Solar photovoltaic systems, more commonly known as solar PV, convert solar energy into electricity. These systems reduce the amount of energy that you need to purchase from the grid, lowering your energy use and saving you money.

Solar systems are generally mounted on the north facing aspect of your roof and are a smart addition to both new and existing homes. Solar systems should be matched to the likely daytime energy usage in your home for the best return on investment.

The type and size of a system will depend on your site-specific requirements including the orientation and pitch of your roof, how much roof area is available, whether there is any shading from nearby trees or buildings and what roofing materials have been used. Always use a **Clean Energy Council accredited retailer and installer and obtain a number of quotes.**

***Fact: A four-kilowatt solar system can save up to \$900 annually for an average family, with a five-year payback period!***

Source: [www.cleanenergycouncil.org.au](http://www.cleanenergycouncil.org.au)

## » HEATING AND COOLING

Even after including passive design elements in your home and ensuring that it is as energy efficient as possible, you may still be looking to install heating and cooling for use on very cold and very hot days.

Heating and cooling systems are a major contributor to the overall energy consumption of an average home and are often the biggest energy consuming item. It pays to consider the following tips:

- Seek advice from an expert who can determine the size of the unit required. An undersized unit will work harder, and an over-sized unit will be inefficient and have a larger upfront cost;
- Seek advice from an expert who can **determine the size of the unit** required. An undersized unit will work harder, and an over-sized unit will be inefficient and have a larger upfront cost;
- Refer to the Zoned Energy Rating Label (ZERL) for details on which **climate zone** the unit operates most efficiently in. From the three possible climate zones, the Camden Local Government Area is located within the **“Average”** zone. Select options from this climate zone to achieve a unit that is cheaper to operate and make your home more comfortable. This label will also advise you of how noisy the unit is when operating at full power; and
- Compare star ratings on various models to determine the most energy efficient model. Remember, the more stars the more energy efficient the model is.

**Fact: Around 40 per cent of household energy is used for heating and cooling to achieve thermal comfort.** Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)

**Tip: On the Zoned Energy Rating Label, if two products have the same capacity output you can see which product is more efficient by comparing the star ratings for your climate zone, or by comparing the total energy consumption figure for your climate zone.** Source: [www.energyrating.gov.au](http://www.energyrating.gov.au)

## » HOT WATER SYSTEMS

Water heaters are generally the second biggest energy consuming item in a home, accounting for up to a quarter of energy use. ([www.yourhome.gov.au](http://www.yourhome.gov.au))

There are a range of hot water systems available.

Electric storage systems are the most common systems as they are the cheapest to buy and install, however, they are generally more expensive to run. If you do purchase an electric storage system, make sure it uses off peak energy to heat your water.

Solar hot water systems use panels or tubes on the roof of your home to heat water that is stored in a tank, located either on the roof or on the ground. In cooler climates, solar hot water units may require an electric or gas booster to ensure a reliable supply.

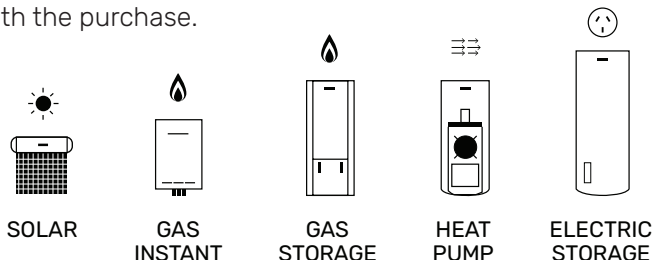
Heat pump hot water heaters are efficient and use a refrigeration cycle to extract heat from the air – they operate like a fridge in reverse. These systems are installed at ground level and can be noisier than other systems. Not all systems will be suitable for cold locations where the air temperature regularly falls below five degrees Celsius.

Solar and heat pump systems have a higher upfront cost but are cheaper to run. Instantaneous gas hot water heaters are usually installed outdoors at ground level. These systems require access to a reticulated natural gas supply or can be run from LPG cylinders. These systems have medium upfront purchase and running costs.

**Fact: Heating water uses up to 27 per cent of the energy used in an average Australian home.** Source: [www.energy.gov.au](http://www.energy.gov.au)

Before purchasing a hot water unit, you should consider the following:

- Your family size and tank size requirements – oversizing the unit will cost you more to run;
- How and when you use hot water;
- Local climate – as some options may not be suitable;
- Energy star rating – compare similar products to find the most energy efficient system; and
- Installation and running costs – check whether any rebates are available to assist with the purchase.



**Figure 7** – Types of hot water systems. Source: Sustainability Victoria

## » LIGHTING

In the average home, lighting accounts for approximately eight to 15 per cent of the total energy consumption (Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)).

Lighting technology is constantly changing, with dramatic improvements in energy efficiency. To improve the energy efficiency and savings of your home, consider the following options:

- Light technology – use movement and daylight sensors to ensure that lighting is only used when it is needed;
- Light design - use natural light where possible to reduce the amount of lighting needed in your home. The use of skylights is a great option but ensure that they are well insulated to avoid unwanted heat gains; and
- Energy-efficient light options – there is a huge range of energy-efficient lighting commercially available, including compact fluorescent, LED and solar outdoor lighting.

## » APPLIANCES

Appliances within the home account for about one third of the energy use, with the refrigerator using the greatest amount.

Careful selection of appliances can assist to reduce the energy used in your home and save money. Things to consider, include the size of the appliance, its operation and maintenance requirements. Information to help you choose an efficient appliance and compare similar models can be found at the Energy Rating Label Scheme. The more stars, the more energy efficient the product is and will save you money on running costs.



**Figure 8** – Sample Energy Rating Label. Source: [www.energyrating.gov.au](http://www.energyrating.gov.au)

## » POOL PUMPS

Swimming pool pumps can use vast amounts of energy, so if you have a pool it is important to select the right one as they can be one of the largest users of electricity in the home, accounting for around 18 per cent of the total bill ([www.energyrating.gov.au](http://www.energyrating.gov.au)).

Single speed pumps are expensive to operate as they run on maximum speed all the time. Consider a pump with speed options (dual, multi and variable) as this will save you money in the long run. Like other electrical appliances, a pool pump will have an energy rating displayed. This rating is from one to 10, with every extra star representing a 25 per cent improvement in efficiency.

***Fact: A three-star single speed pump costs \$3,900 to run over the life of the pump, whereas a seven-star variable speed pump would have a lifetime running cost of \$2,750.***

Source: [www.energyrating.com.au](http://www.energyrating.com.au)

## » TRANSPORT

Building an energy efficient home will save you money. However, you may still be a high energy user if you heavily rely on your vehicle for transport.

Consider selecting a site that will give you access to walking and cycling paths, as well as public transport to reduce reliance on personal vehicles.

Although you may not have an electric vehicle, an electric vehicle charging point may be something you wish to include in the build of your new home. It is cheaper than retrofitting and will help to future-proof your home







# WATER

Australia is the driest inhabited continent on Earth, yet Australians are one of the highest consumers of water with 12 per cent of all the water used in Australia linked to use in homes and gardens ([www.yourhome.gov.au](http://www.yourhome.gov.au)).

The decisions that you make in the design and planning of your home and in the selection of fixtures and fittings for renovations and upgrades can add up to make a big difference in terms of water efficiency. Showerheads and toilets are responsible for most indoor water use, closely followed by laundry appliances. Outdoor water use can also be significant, especially if you have a large garden and pool.

## » RAINWATER TANKS

With a changing climate and growing population, extra pressure is placed on our freshwater systems. Camden currently experiences an altered rainfall pattern and rainwater tanks are an easy and beneficial solution to help conserve potable (reticulated) water and reduce your water bills. The water captured in rainwater tanks is not only useful for watering the garden but can also be used within the home to flush toilets and wash clothes.



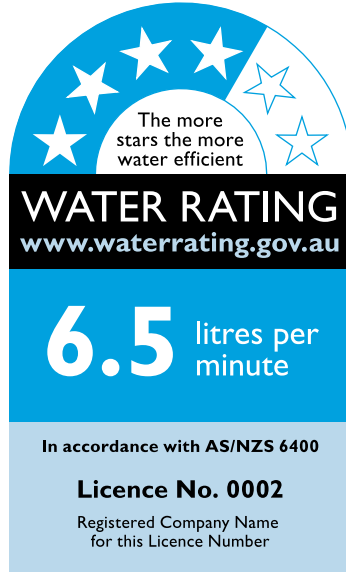
## » PLUMBING DESIGN

Water and energy are often wasted while waiting for hot water to flow. Cost and water savings can be achieved by careful planning and working with your plumber to maximise efficiency. By installing your hot water system close to bathrooms, utility rooms and kitchens less cold water is required to flow through the pipes while waiting for hot water.

Recirculating systems are also a great solution as they send the water back to the hot water tank or rainwater tank while waiting for hot water to flow through.

## » APPLIANCES AND FIXTURES

The use of water wise appliances and fixtures in your home can help you save water and money. Look for the Water Efficiency Label Scheme (WELS) as shown in Figure 9, which provides a star rating to compare efficiency of different products as well as the flow rate to help you make an informed choice. Rating labels are available for shower heads, toilets, taps, washing machines, dishwashers and flow controllers. Remember, the more stars, the more water efficient the product.



**Figure 9** – A sample Water Efficiency Rating Label. Source: [waterrating.gov.au](http://waterrating.gov.au)

## » LANDSCAPING

Landscaping to meet the needs of the local climate will also assist with reducing your water consumption.

Consider using drought-tolerant and native species that will thrive in the local climate and require very little irrigation. This will also save you time watering and encourage local wildlife by providing important habitat and food. For more information, please visit [www.camden.nsw.gov.au](http://www.camden.nsw.gov.au) for your copy of Camden's Native Garden Guide.

You can also reduce the need for irrigation by limiting large areas of lawn and grouping plants that have similar watering requirements together. Using mulch in your garden will also assist with reducing the need for watering.

It's also important to be aware of any water restrictions that may be in place for the outdoor use of water. Sydney Water supplies water in the Camden area, as well as manage and enforce water restrictions.

**Fact: Up to 40 per cent of the total household water used is in the garden.** Source: [www.yourhome.gov.au](http://www.yourhome.gov.au)

## » STORMWATER

Stormwater is rain that falls on the roof or land. Stormwater collects materials as it runs across surfaces including litter, fertilisers, soil and organic matter and can result in pollution of downstream waterways. Too much stormwater can also result in localised flooding and erosion.

Stormwater impacts can be managed by water sensitive landscape design. This approach looks to retain water onsite and minimise the amount of stormwater running off during storm and rainfall events. This can include minimising the use of hard surfaces in your garden, using paving that allows the water to infiltrate through, placing garden beds in strategic locations to absorb water and using landscape features like swales to slow down runoff and allow water to be absorbed by the soil.





# CHECKLIST

Before you commence your building project it's important to make sure that you have the right builder on board.

## Use this checklist to help you get a great start to your project:

- Brief.** Create a brief of what you want in your home to filter out things you do not want or need. Think about the vision of the home and your needs. Why are you building? How long do you intend to live there? What do you love about the land? What sustainability or other outcomes do you want to achieve?
- Budget.** Be clear about your price range - this will help with the selection of your builder, as well as features.
- Communication.** It is important to select someone who is easy to talk to and is willing to listen to your needs and goals. Inform the builder that energy efficiency and a thermally comfortable home is important to you. Learning key terms and concepts will also help you communicate with builders.
- Credentials and insurance.** Ensure your builder has appropriate credentials and insurance. Although it is not essential to engage a 'green' builder it can certainly be a great starting point as they will have a better understanding and interest in homes that are energy and water efficient, cheaper to run and thermally comfortable year-round. The Housing Industry of Australia's GreenSmart accreditation is one example of builder accreditation to ask for that can help you achieve your goals.
- Experience and reputation.** Make sure you seek reviews on your short list of builders. Do they have extensive industry experience? Has the builder undertaken projects like this before using passive design principles? What homes have they built or renovated in the area? Can you visit them? Can they provide contact details for previous clients?
- Additional needs.** Your builder should be passionate and open to exceeding the minimum energy efficiency requirements as set by the National Construction Code (NCC). By engaging an energy assessor to analyse the design plans before the commencement of the build rather than at the end will result in the cheapest and easiest opportunity for you to increase your NatHERS Star rating.

## When building a home, the most important things to think about upfront are location, orientation and the size of your home.

1. **Location** – choose a location for your home that works for you and your family, keeping in mind its proximity to essential establishments and services such as schools, shops and transport.
2. **Orientation** – choose a site for your home that allows for flexible planning and incorporate smart orientation by placing high use living areas facing north.
3. **Size** – consider the size of your home, keeping in mind that larger homes require more natural resources to build as well as increase the running costs for heating, cooling and lighting. Larger homes also reduce the space available for trees and other greencover which can shade the home and provide important local habitat.

## Before and during the design and planning of your home or your renovation building project use the following checklist:

- Room layout** – Are living areas placed to optimise the northern aspect? Are the areas of the home least used such as garage and laundry west facing?
- Shading** – Are west facing windows and walls protected by shading e.g. trees, awnings, shutters? Have eaves been provided to keep summer sun out of the house?
- Windows** – Have you considered the most appropriate glazing for your windows? Do western facing windows have a low SHGC? Do northern facing windows have a high SHGC? Have you used low U-value glazing?
- Natural lighting** – have you optimised the use of natural light?
- Lighting** – Is your lighting energy efficient? Have you thought about sensors and zoning of lights?
- Insulation** – Does the ceiling have bulk and reflective insulation? Do the walls have bulk or reflective insulation? Do the insulation levels exceed the minimum standards set by BASIX?

- Water conservation** - Has a water tank been appropriately sized to your needs? Is the tank connected to outside taps, toilets and washing machine?
- Water efficiency** - Do the fittings and appliances selected have a water rating (WELS) of 4 stars or higher?
- Energy efficiency** - Do the appliances selected have an energy rating of five stars or higher?
- Renewable Energy generation** - Are solar photovoltaics proposed to be installed?
- External finishes** - Are the roof and walls of your home light in colour to keep them cool?
- Thermal mass** - Has thermal mass been considered when selecting building materials?
- Cross ventilation** - Has adequate cross ventilation been provided? Are windows and doors aligned to promote cross ventilation?
- Heating and cooling** - Are fans included in living and sleeping areas? Has the heating and cooling system been sized appropriately? Is the heating and cooling system energy efficient?
- Hot water system** - Is your hot water system appropriately sized? Is it energy efficient?
- Landscaping** - Are native or drought tolerant plants included? Has storm water retention been considered?

# RESOURCES

Want to know more? Here are some links to help you to research and design a home that is more comfortable and affordable to run.

## Appliances

- [www.energyrating.gov.au/label](http://www.energyrating.gov.au/label)
- [www.energyrating.gov.au/sites/default/files/documents/Climate\\_zone\\_mapping\\_-\\_air\\_con\\_FINAL\\_title\\_updated\\_0.pdf](http://www.energyrating.gov.au/sites/default/files/documents/Climate_zone_mapping_-_air_con_FINAL_title_updated_0.pdf)
- [www.energysaver.nsw.gov.au/households/buying-appliances](http://www.energysaver.nsw.gov.au/households/buying-appliances)

## Batteries

- [www.energysaver.nsw.gov.au/media/501/download](http://www.energysaver.nsw.gov.au/media/501/download)

## Choosing a builder

- [www.fairtrading.nsw.gov.au/housing-and-property](http://www.fairtrading.nsw.gov.au/housing-and-property)
- [www.mbansw.asn.au/](http://www.mbansw.asn.au/)
- [www.hia.com.au/products-services/greensmart](http://www.hia.com.au/products-services/greensmart)

## Energy

- [www.energy.gov.au/households](http://www.energy.gov.au/households)
- [www.nathers.gov.au](http://www.nathers.gov.au)

## Energy rebates

- [www.energysaver.nsw.gov.au/households/rebates-and-discounts](http://www.energysaver.nsw.gov.au/households/rebates-and-discounts)

## Heating and cooling

- [www.energyrating.gov.au/sites/default/files/documents/AC%20ZERL%20FS\\_FINAL.pdf](http://www.energyrating.gov.au/sites/default/files/documents/AC%20ZERL%20FS_FINAL.pdf)

## Hot water systems

- [www.sustainability.vic.gov.au/You-and-your-home/Save-energy/Hot-water/Hot-water-running-costs](http://www.sustainability.vic.gov.au/You-and-your-home/Save-energy/Hot-water/Hot-water-running-costs)
- [www.sustainability.vic.gov.au/You-and-your-home/Save-energy/Hot-water/Choose-a-hot-water-system](http://www.sustainability.vic.gov.au/You-and-your-home/Save-energy/Hot-water/Choose-a-hot-water-system)



## **Pool pumps**

- [www.energy.gov.au/households/pool-pumps](http://www.energy.gov.au/households/pool-pumps)
- [www.energyrating.gov.au/products/swimming-pool-pumps](http://www.energyrating.gov.au/products/swimming-pool-pumps)

## **Solar – Photovoltaics**

- [www.energy.gov.au/households/solar-pv-and-batteries](http://www.energy.gov.au/households/solar-pv-and-batteries)
- [www.energysaver.nsw.gov.au/households/solar-and-battery-power](http://www.energysaver.nsw.gov.au/households/solar-and-battery-power)
- [www.choice.com.au/home-improvement/energy-saving/solar/buying-guides/solar-panels](http://www.choice.com.au/home-improvement/energy-saving/solar/buying-guides/solar-panels)
- [www.cleanenergycouncil.org.au/consumers/buying-solar](http://www.cleanenergycouncil.org.au/consumers/buying-solar)
- [www.energymadeeasy.gov.au/get-energy-smart/about-energy-offers/choices-are-good-environment](http://www.energymadeeasy.gov.au/get-energy-smart/about-energy-offers/choices-are-good-environment)
- [www.renew.org.au/free-solar-and-battery-advice/](http://www.renew.org.au/free-solar-and-battery-advice/)

## **Sustainable homes**

- [www.basix.nsw.gov.au](http://www.basix.nsw.gov.au)
- [www.passivehouseaustralia.org/](http://www.passivehouseaustralia.org/)
- [www.yourhome.gov.au](http://www.yourhome.gov.au)

## **Water**

- [www.waterrating.gov.au/choose/water-rating-label](http://www.waterrating.gov.au/choose/water-rating-label)
- [www.tankulator.ata.org.au/](http://www.tankulator.ata.org.au/)
- [www.renew.org.au/resources/how-we-can-help/water/water-conservation/](http://www.renew.org.au/resources/how-we-can-help/water/water-conservation/)
- [www.sydneywater.com.au/SW/your-home/index.htm](http://www.sydneywater.com.au/SW/your-home/index.htm)

## **Windows**

- [www.wers.net](http://www.wers.net)
- [www.efficientglazing.net](http://www.efficientglazing.net)



70 Central Ave, Oran Park 2570



13 CAMDEN (13 226336)



[camden.nsw.gov.au](http://camden.nsw.gov.au)



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