Best Bang for your Buck – the top 10

Try these top ten retrofitting actions to reduce your bills, improve the comfort of your home and provide the biggest return on investment:

1. Start with a simple audit of your home to identify the most energy intensive areas and focus your attention on these areas first.

2. Work with nature by improving shading and ventilation. Start by enhancing air flow and breeze paths, use external shading or curtains and blinds to prevent heat from entering your home and use your fans instead of air conditioners. [Conduct a ‘passive design’ analysis of your home with our site template in the Passive Design Section, pg 2]

3. Install ceiling insulation (with a minimum R value of 3.5) in combination with ridge and eave vents.

4. Upgrade your halogen or older tube style fluorescent lighting to LED or energy efficient fluorescents with fast payback periods.

5. Hot water systems use up to 25% of your power so converting your system to off peak and consider putting it on a timer or turning it off over the summer months can save you money. If your system is old you may wish to upgrade to an energy efficient solar or heat pump.

6. Fridges and freezers use a lot of power so if you have a second fridge or freezer you’re not using – turn it off - it could be costing you up to $250 per year. Check the seals to make sure they work properly, and replace them if needed. Next time you have to purchase a fridge buy one with the highest star rating you can afford – it will pay itself back in power savings.

7. Installing a rainwater tank can save up to 100,000L per annum and makes watering in winter guilt-free.

8. When you have to buy new appliances such as TVs, computers, fridges, air conditioners, and washing machines, buy the highest energy star rating you can afford for ongoing savings.

9. Retrofit your energy hungry pool for big savings by installing a pool cover, reducing filtering hours, converting to the off-peak tariff and upgrading your filter and pump.

10. After you have reduced your bills by following the steps in this guide, future proof your home by installing a solar power system to reduce your bills to $0. If you can’t afford a larger system look at purchasing a smaller system with larger (5kW) inverter to allow you to upgrade later.

Before making any major purchases as part of your retrofit, we encourage you to make sure that the cost of disposing of a product is less than the cost of replacing it. Real sustainability means thinking about the whole cost of your decisions to the environment, society and the economy.

Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Local Environment</td>
<td>2</td>
</tr>
<tr>
<td>Passive Design</td>
<td>3</td>
</tr>
<tr>
<td>Planning and Finances</td>
<td>6</td>
</tr>
<tr>
<td>Building Materials</td>
<td>8</td>
</tr>
<tr>
<td>Windows and Shading</td>
<td>10</td>
</tr>
<tr>
<td>Insulation</td>
<td>11</td>
</tr>
<tr>
<td>Lighting</td>
<td>12</td>
</tr>
<tr>
<td>Appliances</td>
<td>13</td>
</tr>
<tr>
<td>Alternative Energy Sources</td>
<td>14</td>
</tr>
<tr>
<td>Hot Water Systems</td>
<td>15</td>
</tr>
<tr>
<td>Water Saving Devices and Rainwater Tanks</td>
<td>16</td>
</tr>
<tr>
<td>Landscape and Surrounds</td>
<td>18</td>
</tr>
</tbody>
</table>

Publisher and Editor:
Cairns and Far North Environment Centre (CAFNEC)

This document should be cited as:
Cairns and Far North Environment Centre (CAFNEC) (2012) Retrofitting for Sustainability – A guide for far north Queensland, (Author: Sophie Barrett, Green at Heart), Cairns

The Cairns and Far North Environment Centre (CAFNEC) and Green at Heart accept no liability for any loss or damage, including incidental or consequential damages, resulting from use of the information contained in this publication. CAFNEC and Green at Heart give no warranty or assurance, and make no representation as to the accuracy of any information or advice contained, or that it is suitable for your intended use.

Acknowledgements:
The author and publisher would like to acknowledge the contribution of members of the Tropical Green Building Network including Beacon Lighting, BlueScope Water, Effective Energy Solutions, Enviromart, GreenBuild (Emma Thirkell), Naked Energy, NQ Solar, Placid Pools, RPM Environ, The Missing Link, Total Project Group Architects, Tropi-Cool Window Tinting, Geoff Anderson and Heather Fijol.

Cover Photos:
Solar power system (Naked Energy), bathroom by Tony Lawson Designs, rainwater tank (BlueScope Water), house by Chris Vandyke Designs (photo: Sean Reason).

Author: Sophie Barrett
Green at Heart
www.greenatheart.com.au

green at heart sustainable building consultants

There are a number of regulatory issues to consider when retrofitting your home for sustainability which will be referred to throughout this guide. However you should contact your local council for specific regulatory requirements. Always seek the advice of a professional before commencing any renovation work.

Research shows that making your home more energy efficient can add to its value and make it more attractive to potential buyers. Lower power bills are a very attractive feature.

This guide has been developed for the tropical climate of far north Queensland from Cardwell to Cape York, the northern gulf, and west to the Tablelands. It brings together advice and expertise from local designers, builders, installers and suppliers of energy efficient products in our region to provide you with specific ideas on how to retrofit your home for sustainability in the tropics.

We hope you enjoy your retrofitting journey, that you meet many interesting people on the way and increase your own knowledge of sustainability so that you can share your experiences with others. This guide is intended to be passed around and emailed to friends so if you have finished your renovation, please pass it on (along with notes of your experiences of course!).

1. Queensland Treasury (Office of Energy), 2004

In Particular we would like to acknowledge the support of our key sponsors and local businesses who have contributed resources to enable this guide to be produced.

There are a number of regulatory issues to consider when retrofitting your home for sustainability which will be referred to throughout this guide. However you should contact your local council for specific regulatory requirements. Always seek the advice of a professional before commencing any renovation work.
The Local Environment

Coastal far north Queensland has a tropical climate characterised by hot, wet humid summers (the wet season, November to April) and milder dryer winters (the dry season, May to October). Higher altitude areas, such as the Atherton Tablelands, have variable rainfall and temperatures up to 5 degrees cooler all year round. Although the seasons are similar, areas get dryer the further you go inland (such as west of Mt Molloy and Ravenshoe). The climate can be extreme at times, with the risk of cyclones and heavy flooding in summer. In such an extreme environment it is important that our buildings provide us with a high level of safety and thermal comfort.

HIGH TEMPERATURES AND HUMIDITY

Far north Queensland has fairly uniform temperatures with a typical daytime range in Cairns of 23-31°C in mid-summer and 18-26°C in mid-winter.1 We also experience high humidity during the summer months that creates uncomfortable conditions. It is often thought that due to humidity, a 32°C day in Cairns will often feel like a 37°C day in a drier climate.2 Humidity on the Atherton Tablelands is annually at least 5% lower than Cairns.3

SUN PATH AND BREEZES

It is useful to know the sun path and wind directions to better understand the cooling and heating effects on your home. The predominant winds are east to south-easterly with the strongest winds occurring during the winter months. During the summer months prevailing afternoon sea breezes are experienced from the north to north east. In winter the sun rises in the north east and sets in the north west. In summer the sun rises in the south east and sets in the south west.

WATER SOURCES

The coastal and hinterland areas of Far North Queensland are fortunate to have a high annual average rainfall of 1,962mm, most of which falls during the wet season. The region is also affected by the La Nina and El Nino cycles. In the early 2000’s the El Nino cycle left the region very dry for several years with well below average rainfall resulting in water shortages and bushfires in rainforest areas. Water is sourced from various creeks and dams throughout the region. In times of extended dry periods these sources can sometimes struggle to meet the water demands of the community and also leave enough behind for healthy waterways. One area of concern is Rex Creek. It is easy to be complacent about water use in an area of such high rainfall, but growing populations and climatic changes continue to put pressure on our water supplies. The cost of treating and transporting water to our homes and businesses is substantial, with up to 50% of Council’s annual electricity use attributed to water pumping stations and water and wastewater treatment plants6.

SUNPATH

The coastal and hinterland areas of Far North Queensland are fortunate to have a high annual average rainfall of 1,962mm, most of which falls during the wet season. The region is also affected by the La Nina and El Nino cycles. In the early 2000’s the El Nino cycle left the region very dry for several years with well below average rainfall resulting in water shortages and bushfires in rainforest areas. Water is sourced from various creeks and dams throughout the region. In times of extended dry periods these sources can sometimes struggle to meet the water demands of the community and also leave enough behind for healthy waterways. One area of concern is Rex Creek. It is easy to be complacent about water use in an area of such high rainfall, but growing populations and climatic changes continue to put pressure on our water supplies. The cost of treating and transporting water to our homes and businesses is substantial, with up to 50% of Council’s annual electricity use attributed to water pumping stations and water and wastewater treatment plants.

CYCLONES

The monsoon trough is close to far north Queensland from December to March and often brings rain, thunderstorms and the possibility of cyclones and associated storm surges.

WATER SOURCES

There are some sources of renewable energy currently in the Far North including two operational hydro power plants (Baron Gorge and Karheya Hydro). Windy Hill wind farm, cogeneration at local sugar mills, and solar power systems on local businesses and residences. These power sources have the capacity to generate up to 50% of our current regional electricity demand, but in reality they are generating somewhere between 5-40%.5

ENERGY SOURCES

Current peak demand in the region is approximately 360 MW per annum.4 The majority of our electricity is from coal fired power stations and travels long distances from southern parts of the state. Significant transmission losses (up to 20-30%) occur across the distribution network to provide power to the regional and remote areas of north Queensland. Understanding how to take advantage of natural climate conditions throughout the day, can make a big difference to your comfort and energy bills. “Manage your house like you’d sail a ship”.

WHAT IS PASSIVE DESIGN?

Passive design involves taking advantage of natural climate conditions to provide comfort within a building and reduce reliance on heating and cooling energy. When designing a new building, this can include orienting the building and shading windows and walls to exclude summer sun and capture seasonal breezes and the selection of building materials for best thermal performance.

For retrofitting, a good understanding of passive design can help you harness the benefits provided by nature through improving shading and ventilation to make your home comfortable all year round.

ORIENTATION & PLANNING

If possible, orient your building to cooling breezes and to minimise exposure of walls and windows to the summer sun. Ideally the long axis should be facing north (or within 45° of north) thereby minimising the length of east and west facing walls. In our region the summer sun is rarely in the northern sector, so north facing rooms are the coolest and ideal for daytime living. Services and bedrooms are best located in the southern sector. Where possible, avoid having rooms and hallways blocking breeze paths, open doors and consider removing non structural internal walls to allow for uninterrupted cross ventilation.

BUILDING SHAPE

Narrow buildings or separate pavilions (see diagrams below) are best suited to tropical climates as they minimise hallways and create larger areas of external walls allowing for more openings and easier natural cooling of surfaces in the evenings. Promoting the connection between indoors and outdoors through courtyard spaces and pavilions can create great shaded outdoor living areas.

Methods of achieving air movement in your home

Total Project Group Architects

BREEZES

Even in hot humid weather a breeze can help you feel much cooler, with air speeds of up to 1m/s providing a cooling benefit of around 3 to 4°C.1 Ideally your home should have a minimum of two openings in each room to facilitate cross ventilation. Locate windows on the side of breeze paths to the south and south-east (winter and summer) and north and north-east (summer) and provide an opening on the opposite side to draw breezes through.

Commonly older homes have many internal walls and hallways that block breeze paths. Consider removing some of these walls and opening up living areas. This will encourage cross ventilation and allow more natural light into your rooms. As a home user you can control the breezes in your home by opening windows on the windward side and making sure that internal doors are kept open. You can also utilise “night flushing” where doors and windows can be opened at night to draw in cooler air to flush out hot air and cool down internal surfaces.

Roof, eaves and floor vents can be easily installed to help cool your home. Passive roof ventilators or newer solar roof ventilators that use no power, are quiet and can move 14 times the volume of air than the old whirly bird ventilators both work well to reduce heat in the roof space.
One of the best (and least expensive) ways to keep your home cool is by shading walls and windows. This prevents heat from entering the home, keeping your home naturally cool.

To avoid heat gain in your home it is important to have good overhangs. These should be a minimum of 600mm but ideally 900mm works best to prevent the sun heating up walls and entering windows, especially where your home is of concrete block or brick construction. In summer a 900mm overhang will completely shade the walls and windows in the middle of the day.

Where you have large areas of glazing or on walls facing south-east to east and south-west to west it is recommended to provide additional shading. Deep verandas and overhangs provide excellent shading. Other external shading devices which can be used include timber or aluminium external louvres, pergolas, window hoods, shade sails, vertical screens and trees and vegetation.

Within the home, shading windows with blinds or curtains will also help to reduce heat gain.

Lightweight well insulated walls perform best in the tropics as they cool quickly at night. Heavy weight concrete block or brick walls can act as a heat sink and retain heat during the day keeping the home warm during the night. Whilst in some inland areas such as the Tablelands this can be beneficial, in most situations in the tropics this is best avoided. If used, make sure they are light in colour and are well shaded by deep verandas and overhangs.

When renovating, select windows and doors with maximum openability to allow air flow, such as louvres, bi-folds or casements. These windows can open fully, unlike most double hung and sliding windows and doors, which only open from 30-50%. See windows and shading section for more details.

When renovating your home consider whether you really need that extra bedroom. Each bedroom can cost you up to $60,000 to construct and often adds to your ongoing electricity costs.

Window Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Openable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louvre</td>
<td>100%</td>
</tr>
<tr>
<td>Casement</td>
<td>100%</td>
</tr>
<tr>
<td>Sliding</td>
<td>50%</td>
</tr>
</tbody>
</table>

DESIGN FOR ACCESS

Design for change of lifestyle over time including adding an extra support in bathroom and toilet walls for future installation of grab rails, and installing larger door openings, slip resistant surfaces, and easy internal and external access ways.

Retrofitting tips

- Learn to open and close windows, curtains and doors to take advantage of natural heating and cooling throughout the day and night
- Shade walls and windows with external shading devices or vegetation
- Install roof and eaves vents
- Zone areas by positioning living to northern sector and bedrooms and services to the southern sector
- Remove obstacles to breeze paths such as walls and hallways to open up your home
- Minimise east and west facing walls
- Orientate to cooling breezes with a minimum of two openings per room
- Single room width buildings or pavilions work best in tropical climates
- Future proof your home by designing for access for future life stages

1. Sandy McCathie, Guide 2 - Harnessing Cooling Breezes, Planning Services Unit, City of Townsville

Verandas and good overhangs keep the home cool

Chris Vandyke Designs, Photo: Sean Reason
DIY or engage a contractor?

When looking at the scope of your project you need to make a decision about what work you can do yourself and what is legally required to be undertaken by a qualified contractor. You may be able to install light bulbs or external blinds yourself, but improvements such as changing light fittings or fans, extending eaves, window tinting or installing solar hot water systems will need a licensed contractor. Larger works and renovations should be undertaken by professionals.

PLANNING A RENOVATION

Once you have your ideas and suggested improvements in sketch or written form and a rough estimate of your budget, you can move on to planning your renovation. There are a lot of factors to consider. You will need a good architect or building designer if the work is substantial, or a drafting service for minor works. You may also have to obtain approval from Council or a private certifier and access finance for your project. Some people may wish to undertake the project as an owner builder and co-ordinate their own contractors.

ENERGY EFFICIENCY CERTIFICATION

Some renovation work will require the services of an energy efficiency certifier. Your designer, private certifier or Council will let you know if this is required. When undertaking a large renovation you may also need to upgrade the energy efficiency of your home. It is important to consider energy efficiency when purchasing a home to renovate as it may be costly to upgrade to current energy efficiency standards. Additionally it is a good investment to upgrade your home as it may be worth more if you increase the energy efficiency or install energy efficient features. Research in the ACT, where Mandatory Disclosure of a property’s energy efficiency rating at point of sale is in place, shows that each star can add up to $10,000 to the value of the home. A more energy efficient home also means lower running costs and improved comfort as well as a potential higher resale value.

SAFE DESIGN

New Work Health and Safety legislation introduced on 1 Jan 2012 requires all structures intended to be designed to comply with safety requirements any time they are used as, or at, a workplace including during the construction, maintenance and demolition at the end of use. Your designer may also have to provide you with a safety report. As the client you may also have duties under the legislation and should consult your designer for more information.

STRUCTURAL ENGINEER

Your designer will need to consult with a structural engineer to certify or design the structural component of your renovation. If you are doing your own renovation work, you may also need to check with a structural engineer before commencing, particularly if you are looking at making changes to structural walls or windows and doors. In Far North Queensland it is particularly important to ensure that the structure is designed to withstand the wind speeds of the cyclone category applicable to your site.

CHOOSING A BUILDER

There are a number of factors to consider when selecting a builder such as price, availability, workmanship and whether they have an interest in helping you to source environmentally sustainable products. The HIA (Housing Industry Association) have GreenSmart accredited builders and the MBA (Master Builders Association) have a Green Living program. Check with the BSA that the builder is currently and appropriately licensed and obtain three quotes if possible.

A BSA Minor Works Contract should be signed with your builder for work valued between $3,100 and $40,000. For works over $40,000 you should sign a major works contract. Free advice is available by phoning BSA on 1300 272 272 or visiting BSA’s website (www.bsa.qld.gov.au) and free Online Licence Search.

OWNER BUILDERS

You may consider undertaking your project as an owner builder. As an owner builder you will have full control over the project giving you the ability to select your own tradespersons, access builder’s discounts, negotiate prices with tradespersons and create your own schedule which suits when you have the funds available. The satisfaction of creating your own home and saving money are factors that generally draw people to owner building.

It is important to be aware that you also take on many of the responsibilities of the builder including being personally responsible for dealing with individual contractors if problems in workmanship occur, for payments to rectify any defects in the building work or to complete any work left incomplete by an individual contractor as well as complying with the current Workplace Health and Safety legislation. Fortunately there are courses in owner builder which provide participants with information on how to manage your own builder project. On successful completion you can apply for an owner builder permit from the Building Services Authority.
Building Materials

Selecting the right materials can make your home healthier and safer, as well as reduce the impact of your renovation on the environment.

SELECTING BUILDING MATERIALS

Lightweight versus heavy weight construction?

This is a question commonly asked in north Queensland. In general, lightweight timber framed structures do not rely on air-conditioning as the most energy efficient option. Lightweight structures, such as the ‘Queenslander’, are typically timber framed and clad, and elevated to release heat quickly. Heavy weight structures are typically made of brick or block and sit on a concrete slab on the ground. Both have their benefits and the efficiency and comfort of each can be improved through retrofitting.

Lightweight homes are ideal for natural ventilation as they do not store as much heat in their materials. Ideally lightweight homes should be elevated so breezes can be directed through the home and under the floor to keep it cool. To perform optimally they should have well ventilated and insulated roofs and walls and excellent cross ventilation.

Heavy weight structures can perform well if they are light coloured and have good overhangs (900mm ideal), roof ventilation and insulation. Slab-on-ground floor construction (with tiled surface) can perform well and can keep the home cool as long as the slab is not being heated by sun coming through glazed areas. In the tropics, concrete block homes with minimum overhangs and poorly ventilated roofs can be very hot as they store heat in the walls during the day. Retrofitting to shade walls and windows can greatly enhance the thermal comfort of these homes.

Do some research to find products that have a good life cycle and eco-footprint. Many manufacturers are now promoting these features as part of their marketing. Sourcing products and suppliers locally helps support local businesses and reduces the number of carbon miles of that product. Timber products should be sourced from plantations or through legitimate sustainable timber certification schemes. (See the Forest Stewardship Council, www.fscaustralia.org).

Roofs

Using light coloured metal roof sheeting or roof paint will reflect heat and keep your home cooler. Metal sheeting also has the advantage of releasing heat quickly at night. Installing reflective foil insulation under the roof sheeting and bulk insulation on the ceiling with vented eaves and ridge vents can make this an effective system. Tiled roofs slowly absorb heat and re-radiate it into the home at night which can make it harder to cool your roof space.

Consider the use of a green roof such as soil filled plastic cells with plants or grass to keep your home cooler.

Walls

Lightweight insulated walls with breathable sarking (reflective foil or other flexible membranes for waterproofing, vapour proofing or thermal reflectance) are ideal in far north Queensland to keep your home cool and reduce condensation and mould growth. Well shaded concrete block can also perform well. Use light colours for best performance.

Floors

The earth maintains a constant temperature during the day and, so slab-on-ground can keep your home cool in summer if well shaded. Lightweight elevated timber floors can cool easily and release heat that has built up during the day.

Finishes & colours

Zero or low VOC paints and finishes (see hazardous substances below) are a good choice for your renovation. Not only do they have the benefit of improving the quality of your indoor environment but also are safer for the installers to apply.

Light coloured works very well in far north Queensland for reflecting heat and can improve the energy efficiency rating and comfort of your home.

Recycled materials and reducing waste

Recycled materials reduce resource depletion and can be sourced in far north Queensland through various suppliers. For housing there are many products available for internal or external use. Some options include insulation products made from recycled glass or plastic, ‘wood’ products made from recycled plastic used for decking or landscaping, or recycled plasterboard. Many commonly used building products such as some particleboard and external cladding products contain recycled content. Visit local website www.recycedbuild.com.au to source recycled building products for your renovation.

Minimise construction waste by designing to suit material widths and sheet sizes. Some waste materials such as scrap metals (eg. steel and copper) can be recycled, although there are currently limited options in far north Queensland for recycling construction waste. Please contact your local council for more information.

Lead

Lead paint is most likely to be found in homes built before 1970, and lead can also be found in items such as old PVC pipes and flashing. Ingesting lead is harmful, particularly to children. When renovating, be particularly careful when stripping, sanding, abrasive blasting or burning paints containing lead. Some hardware stores have home test kits available. If you do find lead in or around your home, phone your state health unit for advice and use a qualified contractor.

Volatile Organic Compounds (VOCs)

Volatile Organic Compounds (VOCs) are chemicals that evaporate into the atmosphere at room temperature. They often have an odour and can be found in a wide range of household products, construction materials, new furnishings and also in paints, varnishes and adhesives. VOCs can be emitted from products for up to 7 years after application. Make sure the room is fully ventilated when applying these products and until the odour considerably disappears. Select paints and adhesives with a low or no VOC content. Ask your builder or supplier about the VOC content of any building construction materials selected for internal and external application.

OTHER HARMFUL SUBSTANCES

Treated timber

Timber can be treated to increase its longevity with pesticides and wood preservatives, including heavy metals and in some cases arsenic. Appropriate protective equipment should be used, and if in doubt consult an expert. Treated timber can be hazardous when sawing or sanding and hands should be washed after handling, children should not eat soil around treated timber. Treated timber should also never be burnt as it emits dangerous gases.

PVC

PVC is commonly used for pipes and can be hazardous. Avoid breathing dust and fumes and do not heat.

Termite treatments

When renovating it is preferable to use physical rather than chemical barriers termite treatments. Steel mesh products can be very effective and low toxicity chemical options are available. Always seek the advice of a professional when dealing with hazardous substances.

Retrofitting tips

• Consider the lifecycle of materials before selecting
• Choose materials with recycled content
• Choose low or no VOC paints and finishes
• Use appropriate protective equipment when sawing or sanding
• Insulate and shade lightweight walls and use light colours
• Beware of hazardous materials when renovating
• Visit www.greenbuild.com.au for a directory of local sustainable building products and services

Haider mass homes can work well if well shaded and light coloured
Chris Vandyke Designs. Photo: Sean Reason

Mould and Mildew

Mould is a problem in far north Queensland, especially in the wet season. Make sure roofs and walls are breathable (eg. breathable sarking and roof/wall vents) to reduce the amount of mould and moisture accumulating. Condensation can occur outside air-conditioned zones in walls and insulation products. Good cross ventilation is a must. Ventilated shelving is also useful in liner cupboards and wardrobes.

There are a number of mould resistant products, paints and finishes, but make sure that they do not contain any harmful chemicals. Natural remedies such as clove oil and vinegar can be effective in preventing the growth of mould spores on walls and surfaces.

HAZARDOUS SUBSTANCES

When renovating your home you need to be aware of the possibility of hazardous substances including those shown below.

Asbestos

Asbestos is a naturally occurring fibrous silicate mineral that can be harmful if disturbed during activities which produce fibres or dust including maintenance or renovation. The importation or use of asbestos containing products has been prohibited since 2003 but was phased out from the mid 1980s. Some post-2003 buildings may still contain asbestos due to product stockpiling by distributors. It can be found in items such as cement sheeting, roof sheets, some textile paints, vinyl floor tiles, pipe lagging, growth forest chip boards, and around ovens or heaters. It is important to always seek professional advice about managing or removing asbestos in your home.

Asbestos

Lead

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos

Asbestos
Windows and Shading

Windows are not only the eyes of your home but also one of the items that can best be adapted to help improve your thermal comfort and reduce your energy bills.

Heat enters your home when sunlight passes through the windows heating the air and surfaces inside. Effective management includes good cross ventilation with a minimum of two openings in each room and the installation of external shading devices.

In air-conditioned homes, you should first look at reducing heat entering the home as your air-conditioners will have to work harder to keep the occupants comfortable.

Factors influencing heat gain through windows are orientation, types of windows and glass, window coverings such as blinds and curtains, and shading.

**ORIENTATION AND SHADING**

Windows are best located to the north, while large glass windows to the east and west should be minimised. Windows should also be orientated to capture breezes, particularly summer breezes from the north to north-east. Overhangs should be designed to be at least 600mm, with 900mm being ideal.

For existing window retrofitting external awnings, internal curtains or blinds, and window tinting, can considerably reduce heat gain. For east and west facing windows consider rubber backed or double thickness curtains. Some external shading solutions include:

- Planting shade trees or shrubs
- External louvres
- Shade sails
- Increasing overhangs and adding verandas
- Window hoods and awnings
- Replacing glass windows with timber or aluminium louvres.

**WINDOW AND GLASS TYPES**

When selecting window styles for an extension or replacing existing windows, bi-folds, louvres, casement windows (100% opening) and triple slides (66% opening) allow for the best ventilation for your home. You can also increase the size of your openings by replacing windows with sliding or bi-fold doors to allow more air into the home.

There are various types of glazing available. Clear glazing transmits around 83% of the solar radiation inside. Select tinted or low-emissivity glass (thermal glass) to reduce the heat gain through your windows. Frames can also conduct heat into your home. Timber frames are best or aluminium frames with a thermal break which stops heat conducting through the frame.

WERS (Window Energy Rating Scheme)

You can check the thermal performance of different window products to see how they perform at www.wers.net much in the same way as appliance star ratings. For far north Queensland look for the highest number of cooling stars.

**WINDOW TINTING**

Applying tinted window films can greatly reduce the amount of summer solar heat gain for existing windows, in some cases by up to 75%, as well as reducing glare and the need for air conditioning.

Choose a film that is dark or reflective and has a low SHGC (Solar Heat Gain Coefficient, eg. a SHGC of 0.18 will allow 18% of the sun’s heat through). Be aware that a very dark tint may increase your need for artificial lighting.

Silver reflective foils have excellent performance but the reflected light may be dangerous to passing motorists and flying birds and irritating to neighbours. Tints are available in silver, grey, green and blue for different effects and there is even a security tint that makes it hard for thieves to smash and remove windows. Most tinting installers offer a lifetime warranty (until the house is sold) against faults such as fading, peeling, bubbling and cracking.

**CROSS VENTILATION**

Installing windows on the windward size (north to north-east in summer, and south-west to south-east in winter and summer) and increasing opening sizes can promote cross ventilation.

Make sure there are a minimum of two openings in each room and that you open windows and doors within your home to obtain maximum benefit.

**WINDOW TINTING**

Applying tinted window films can greatly reduce the amount of summer solar heat gain for existing windows, in some cases by up to 75%, as well as reducing glare and the need for air conditioning.

Choose a film that is dark or reflective and has a low SHGC (Solar Heat Gain Coefficient, eg. a SHGC of 0.18 will allow 18% of the sun’s heat through). Be aware that a very dark tint may increase your need for artificial lighting.

Silver reflective foils have excellent performance but the reflected light may be dangerous to passing motorists and flying birds and irritating to neighbours. Tints are available in silver, grey, green and blue for different effects and there is even a security tint that makes it hard for thieves to smash and remove windows. Most tinting installers offer a lifetime warranty (until the house is sold) against faults such as fading, peeling, bubbling and cracking.

**CROSS VENTILATION**

Installing windows on the windward size (north to north-east in summer, and south-west to south-east in winter and summer) and increasing opening sizes can promote cross ventilation.

Make sure there are a minimum of two openings in each room and that you open windows and doors within your home to obtain maximum benefit.

**RETROFITTING TIPS**

- Add external shading or tinting to windows to keep your home cool
- Install curtains or blinds for a cost effective way of reducing heat gain
- Replace window and doors with types that increase ventilation such as bi-fold, louvres, casements and triple sliders
- Add an extra opening to rooms to promote cross ventilation
- Make sure you have windows in the right location to capture breezes
- Check window and door seals to reduce load on your air-conditioning
- Purchase windows with a high WERs rating

**MATERIALS**

- Timber frames are best or aluminium frames with a thermal break which stops heat conducting through the frame.
- Select tinted or low-emissivity glass (thermal glass) to reduce the heat gain through your windows.
- Frames can also conduct heat into your home.

**THE NORTHERN TERRITORY**

In the northern territory, you should consider the following:

- North-facing buildings
- Wall insulation batts
- Ventilation
- Insulation

**INSULATION**

A good roof insulation system is typically the most cost effective way to improve a home’s energy efficiency and could save you up to $200 each year on your electricity costs. Insulation creates a barrier to heat transferring through ceilings and walls and keeps your home cooler. Although all newly-built homes must now be insulated, many older homes, up to 40% of Australia’s housing stock, remain un-insulated.

**HOW DO I KNOW IF I HAVE INSULATION ALREADY INSTALLED?**

You can inspect your roof space to see if you have insulation installed. Bulk insulation will usually be fluffy, tan or pink, and be installed between your ceiling joists or as a blanket with a foil lining under it. Old insulation may not be effective and may need replacing.

**TYPES OF INSULATION**

Bulk insulation: includes materials such as glass fibre, cellulose fibre, polyester (made with a percentage of recycled PET bottles), polystyrene and wool. There are also recycled glass wool products and products that are free from formaldehyde, phensols, acrylics and dyes.

Reflective insulation: includes reflective foil laminates (RFLs) or reflective bubble and polystyrene products that reflect up to 95% of heat entering a roof, and act as a vapour barrier and very important condensation barrier.1 These are best installed directly under the roof sheeting at construction stage. It is possible to retrofit RFLs on existing homes but there are potential electrical hazards, so work should only be undertaken by a professional contractor.

Loose-fill insulation: is best suited for flat or timber roofs, and consists of shredded or granulated material (usually newspaper) supplied in a loose form and treated to make it pest and fire resistant. It may settle over time, reducing its effectiveness, so ask your contractor to advise you of the “settled R-Value”.

**R VALUES**

The R-Value is the most important thing to consider when choosing insulation and is a measure of the material’s resistance to heat flow. The higher the R-Value, the greater the resistance and better the performance. Ask for a product R-Value (of the material itself) rather than a system R-Value (of the roof product, airspace and product) as this will make it easier for you to compare products.

**THINGS TO WATCH OUT FOR:**

- Recessed downlights: in particular, halogen low voltage downlights run very hot, are a fire hazard and should either be removed, or covered with a protector and the recommended clearance allowed.
- Dust & Setting: a layer of dust on the reflective surface will greatly reduce performance of your reflective foil, so it should be regularly maintained. Insulation has a lifetime as it compresses over time.

**DIY**

Check with your insulation supplier to see whether you are able to install your own ceiling batts and make sure you purchase protective equipment and install as per manufacturer’s instructions. VERY IMPORTANT - Turn off the power before entering the ceiling space and DO NOT work in the middle of the day as the space will be very hot. Maintain clearance around down lights or use down light covers.

**INSULATION SYSTEMS**

Homes with a pitched roof and flat ceiling can be easily retrofitted by installing batts with a minimum R-Value of 3.5 on the ceiling and a good roof ventilation system. Foil-lined batts can help prevent condensation, particularly in air conditioned homes. Reflective foil can also be retrofitted under roof sheeting, however this can be costly and should only be undertaken by a licensed contractor.

For flat or skillion roofs the roof sheeting is often removed to install insulation batts although there are some loose fill insulation products that can be blown in to the roof cavity.

Block walls can have insulation installed on the wall exterior using polystyrene board or batts fixed between battens at 600mm centres and treated with a weatherproof cladding.

**RETROFITTING TIPS**

- Insulate your verandahs for comfortable outdoor living
- Insulate east and west facing walls
- Make sure your insulation has a high product R-Value
- Install insulation in conjunction with roof and eaves vents to further reduce roof temperatures and condensation
- For naturally ventilated homes consider the following:
  - Ceiling insulation with a minimum downward R Value of 3.5
  - Reflective foil under the roof with an air gap of at least 55mm
  - Ventilated roof, eaves and ceiling
  - Insulate walls with a minimum R1.5
  - For air-conditioned homes consider the following:
    - Insulate roof and floors with high upward and downward R value insulation, minimum of R3.5
    - Seal building well for maximum efficiency
    - Install a vapour barrier to prevent condensation

2. Earthwool insulation batts courtesy of Effective Energy Solutions
Lighting can contribute significantly to your energy bill particularly if you have halogen or old-style tube fluorescent lighting installed. The good news is that upgrading your lighting is relatively inexpensive and will quickly pay back the investment.

**TYPES OF LIGHTS**

There are three main types of lights: incandescents (including halogen), fluorescents and LEDs (light emitting diodes). The incandescents have now been phased out.

A type of incandescent often used in down lighting and are high energy users. A standard halogen uses 10% of its energy to generate light and 90% to generate heat (up to 500°C), which will add significantly to your cooling costs. Halogen lights may also eventually be phased out. If you have a dimmer, a simple adjustment can save you over 50% of the energy use by decreasing the brightness of your halogen.

Fluorescent Lighting – CFL and tubes

Much more energy efficient and have a longer life that incandescent or halogen bulbs. Most fluorescents have a charge time using about 5 times the bulbs wattage for the first 5 minutes. Disposal is an issue as there is a small amount of mercury, a hazardous substance, in each globe. Contact your local council to see if there are any recycling options available. Fluorescent lights, including CFL and T5s, contain the rare metal lithium in the electronic ballasts, which at current consumption rates may run out in the near future.

**Light Emitting Diodes (LEDs)**

Convert most of their energy to light (not heat) and use up to 90% less energy than incandescents. They also produce more light per watt and have a rated lifespan of up to 80,000 hours. They reach full brightness instantly and operate at a low voltage making them cool to touch and safe to handle. They do not contain mercury or other harmful gases and are becoming more affordable.

**Retrofitting tips**

- Utilise natural daylight by adding or increasing windows, opening curtains and having light coloured internal and external surfaces
- Install solar tubes or skylights for free lighting!
- Utilise dimmers to reduce use
- Halogens are not energy efficient but lower wattage halogens are available
- New homes are required to install minimum 80% energy efficient lighting.

**RETROFITTING TO ENERGY EFFICIENT LIGHTING**

To retrofit your halogen lights you must first determine whether they are 12V or 240V. To determine the voltage you can look at the pins. The thinner pins (approx 2-3mm Ø) are 240V and the thin pins (approx. 1mm Ø) are 12V.

Bulbs in 240V fittings can be directly replaced with GU10 CFL or LED. For 12V fittings it is possible to use 12V LED lamps, although you should check with your lighting suppliers as not all lamps will be compatible and it is often more cost effective in the longer term to replace the whole fitting.

**REPLACE T12 AND T8 TUBE FLUOROS WITH T5 OR LED**

T8 fluorescent tubes are not very efficient and can be added to your power costs. Retrofitting these with the slimmer T5 fluorescents which use 30% less energy is a good option. It can be expensive to retrofit T5s as an attachment is needed in addition to the globe. A recently available solution is the LED equivalent to the T8 which can be placed into the standard T8 fitting.

**Calculating appliance energy use**

Look for the watts rating on the plate on your appliance (eg. 600W - the watts per hour). Multiply this by the number of hours used per day and multiply this by 365 to obtain an annual energy use. For example:

<table>
<thead>
<tr>
<th>Watts per hr</th>
<th>Hrs Used per day</th>
<th>Days Used p.a.</th>
<th>Total kW</th>
<th>$ per kW</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fridge</td>
<td>89</td>
<td>24</td>
<td>365</td>
<td>0.21</td>
<td>$164</td>
</tr>
<tr>
<td>Air-conditioner</td>
<td>1800</td>
<td>8</td>
<td>250</td>
<td>0.21</td>
<td>$756</td>
</tr>
</tbody>
</table>

**AIR-COONDITIONERS (ACs)**

Air-conditioning accounts for up to 40% of your energy bills. A single unit can cost around $180 per quarter. Older model air conditioners can be badly designed, noisy and expensive to run. Energy Efficiency Ratios (EER) gives us a way of judging performance. In Queensland the EER has to be greater than 2.9. Good systems reach 4.

Consider replacing older box type split system ACs with modern inverters and choose high star rated options. Outdoor units can be noisy so locate away from windows and outdoor living areas, at ground level for maintenance, and consider the distance from your neighbours. A well shaded location will improve the energy efficiency. Creating zones for AC use by closing doors off with doors can help ACs to work more efficiently.

Regular cleaning and maintenance of filters can make the AC units run more efficiently saving power. A ducted system may be more efficient if you are air-conditioning multiple rooms but make sure each room has individual controls. Ducted systems have a long life, are quieter and although more expensive initially they usually save over time and work well with solar power systems. Ducts should be well insulated.

Solar Hybrid ACS can also be available that may save up to 50% of your AC running costs.

Set temperatures to 25°C in Summer. Each degree cooler can add up to 10% to the running costs.3

**FANS**

Fans cost as little as 1c per hour to run, and work well with your natural ventilation system. They can also be used in conjunction with higher temperature settings on your AC. Choose longer blade options (1400mm) as they are more effective and can increase your homes energy rating by one or two stars.4

**REFRIGERATION**

Refrigeration accounts for around 7% of household energy use. When retrofitting your home consider upgrading to a more efficient model. A 4-star fridge/freezer uses $80 less electricity than a 1-star model over 10 years.5 Set the thermostat between 3 to 5°C.

**WASHING MACHINE AND DRYER**

Front loading washers are more energy efficient though most heat their own water, this is more efficient than an electrical hot water system but will not save you money if you already have a solar hot water system installed. Use cold wash and eco settings. Install an undercover line so you don’t have to use a dryer.

**DISHWASHER**

Selecting a high star rated dishwasher with low water use can be more water efficient than hand washing dishes (however uses more electricity). Consider using the dishwasher at night and switching to the cheaper night Tariff 33 and using economy settings.

**STANDBY POWER**

You could save up to $100 per annum by switching appliances off at the wall. Consider the purchase of remote power-off devices for your power points, or if you are renovating you can have your electrician wire power points so they can be switched off at a central point at the end of the day. Locate power points in easy to reach areas to allow them to be switched-off when not in use.
Solar Power

Our region has an ideal climate for solar power generation, with 9 months of sunny weather and 3 months of 50% sun. Solar power systems have come down in price as a result of the strong Australian dollar, good government incentives and feed-in tariffs encouraging investment in solar. Reduce your energy by following recommendations in this guide to gain greater benefits from your system.

GRID CONNECT SYSTEM
1. Solar energy is converted by panels to DC power during daylight hours (mainly 9am-3pm).
2. An inverter converts DC power to AC power.
3. Power is used by household appliances first.
4. Any excess (not used) is sent to grid and credited to your bill.
5. At night, or if demand is greater than your system provides, electricity is drawn from the grid.

FEED IN TARIFF AND GOVERNMENT INCENTIVES
The feed-in tariff applies to grid connect systems whereby the excess electricity (ie. not electricity, not gas!) that you do not use during the day is fed back into the grid and credited to your bill. The average rate of the feed-in tariff is $0.06 per kWh. To achieve the maximum financial benefit from your feed-in tariff consider using your appliances outside the peak generation hours of 9am to 3pm.

SOLAR HOT WATER SYSTEMS
Solar hot water systems use the sun’s energy to heat water which is then either stored in a roof tank or ground level tank (called a “split system”).

When building a new home it is compulsory to install a solar, heat pump or gas hot water system. Electrical systems will soon be phased out. The plumbing and wastewater code also require that the system be placed as close as possible to the main bathroom to improve efficiency.

GAS HOT WATER
Gas systems can be instantaneous or storage systems. Instantaneous systems just heat the amount of water being used and are quite efficient. New homes require a minimum 5 star system. In our region, as the majority of areas require bottled gas, these systems often prove more costly to run. The lifecycle emissions of gas are also very high due to the energy used in extraction and transportation.

Wind power

Wind turbines are available for household use. These systems are useful where you have limited access to sun. They can be connected as standalone or to the grid and rebates are available.

A solar evacuator tube model with circular tubes is available that manufacturers’ claim works better on cloudy days and are more efficient at heating water due to the circular shape of the tubes. Solar panels are best placed in a sunny location facing north or 45° from north (without significant loss of efficiency) and at an angle to close to the latitude as possible. Solar hot water systems are fitted with an electric or gas booster to increase the supply of hot water when it may otherwise be inadequate. Boosters can be operated manually or controlled by thermostat. Wiring your electric booster to the off-peak tariff and using a timer can save you hundreds of dollars per year.

Heat pumps and heat pumps if you are replacing an existing electric hot water system. Ask your installer for the latest information.

HEAT PUMP HOT WATER SYSTEMS
Heat pumps are energy efficient and can offer savings of up to 80% on your hot water bills and work well on cloudy days and in shady locations. Working like an air conditioner in reverse, they super heat a jacket of coolant surrounding the water to maintain the water temperature and expel cold air to the surrounds. The only electricity is running the air-conditioning compressor utilising a fifth of the electricity used for normal electric hot water systems. They are easier to install than solar hot water as they can directly replace an electric system with no additional plumbing required.

Retrofitting for Sustainability - a guide for far north Queensland
### Water Saving Devices & Rainwater Tanks

#### Cairns residents individually use an average of 212 litres (L) per day with Port Douglas at 608L per day.

If each person in the city of Cairns reduced their water consumption by 50 litres per day the total saving would be almost 6.5 million litres per day or 2,400 million litres per annum. The cost of treating and transporting water to our homes and businesses is substantial with up to 50% of Cairns Regional Council’s annual electricity use being attributed to water pumping stations and water and wastewater treatment plants.

#### Rainwater Tanks

**INDOOR USE**

In far north Queensland, annual rainfall exceeds 2,000L/m². For the average 200mm roof this equates to 400,000 litres of water that ends up in stormwater - more than the annual water use for a household of 4 people. Rainwater can be used for irrigation, indoor household use or drinking (with a suitable filtration device - check with your local council for requirements).

When building a new home it is now a mandatory requirement throughout most of Queensland to install a 5,000L rainwater tank plumbed for indoor use for laundry, toilets and the rear garden tap.

**OUTDOOR USE**

Rainwater tank, Bluescope Water

On average, up to 27% of potable drinking water is used outdoors and for irrigation so a rainwater tank can result in significant water savings. Consider raising your tank to use gravity rather than using a pump.

**Retrofitting Tips**

**Rainwater tanks**
- Choose a larger tank if you have the room, as this can save you money and water (up to 100,000L per annum) in the long term.
- Always make the slab 200mm longer and wider than the tank footprint and above flooding levels. Cyclone tie downs are needed and cost effective details are available from all manufacturers.
- Install a gutter guard and/or first flush diverter to keep water free from leaves and contaminants.
- Ensure the overflow pipe diameter is equal or greater than the inlet downpipe diameter.
- Choose a light coloured tank to reflect heat, especially if it is located in the sun.
- A submersible pump is quieter and more secure.
- Maintain and inspect annually including checking of inlet, overflow and outlet pipes.
- Check access for tank delivery and height of gutters and location of downpipes.
- Direct overflow to the garden and avoid neighbouring properties.

**Greywater and Stormwater**

Greywater (waste water from fixtures such as showers, laundry and taps - but not the kitchen) can be recycled and reused. Check with Council before installing in your area as there are restrictions regarding distances from watercourses and approval is required. In the Cairns Region, the minimum distance required from a watercourse is 50 metres.

**GREYWATER TREATMENT SYSTEMS**

Greywater can be treated on site and used for toilet flushing and laundry use. This requires extensive treatment and is expensive to install.

**GREYWATER DIVERTER**

Another option is a greywater diverter which works by diverting greywater though a filtration device which is then connected to an underground drip irrigation system using the soil to filter out contaminants and odours. Spray irrigation is not allowed due to contaminants in the water. It is best to use the diverter in conjunction with grey water garden safe detergents and soap. A grey water diverter can save up to 150,000L per year.

If you are renovating and thinking of installing a greywater system at a later date, it is worth designing your plumbing to be accessible for future installation.

**STORMWATER MANAGEMENT**

On site water retention is important in urban areas as it helps to replenish the water table, but also means that you use the water already falling on your property. Encourage onsite water retention by minimising non-porous areas and through the use of grass, landscaping, pebbles or stormwater management systems (eg. Atlantis cells) to construct driveways and paths. Stormwater can also be reused for gardening.

---

### Saving water indoors

**Retrofitting tips**

**Water devices**
- Check for leaks
- Install a 4 star water efficient toilet
- Install a low flow showerhead
- Install tap aerators
- Install a pressure limiting device or return valve
- Upgrade dishwasher or washing machines with water efficient models

---

### Water Leaks and Dripping Taps

Regular checking and maintenance can reduce the amount of water wasted through leaking pipes and dripping taps. A single dripping tap can waste up to 10,000 litres of water a year, while a visibly leaking toilet can waste more than 90,000 litres. Toilets can be checked by putting food colouring in the cistern and checking if it appears in the bowl. Leaks in the pipes can be checked by turning off all the taps and reading the meter before and after one hour. If you notice a change you may have a leak.

**Comparison**

<table>
<thead>
<tr>
<th>Water Savings (kL/a)</th>
<th>Efficient (kL/a)</th>
<th>Inefficient (kL/a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shower</td>
<td>51</td>
<td>115</td>
</tr>
<tr>
<td>Toilet</td>
<td>13</td>
<td>46</td>
</tr>
<tr>
<td>Washing Machine</td>
<td>25</td>
<td>47</td>
</tr>
</tbody>
</table>

**Indicative savings in annual water for a 3 person household**

KLA = kilo litres (1,000L) per annum

**RETURN AND PRESSURE LIMITING VALVES AND COLLECTORS**

Pressure limiting valves are now required in all new homes and can save up to 10,000L, per annum. These can be retrofitted at the boundary of a domestic installation to control supply pressure to a set maximum pressure across the whole installation.

Return valves can be installed at any point where hot water comes out (eg. shower, tap). If there is a long distance between your hot water system and the tap, the cold water in the pipes can be returned to the hot water system so the flow does not start until the water is a certain temperature, thus saving water. Other products collect the cooler water at the shower point until the hot water arrives and then release it with the flow. Insulating your hot water pipes can also mean less time to wait for hot water. Ask a licensed plumber for more details.

---

**The Top Three Water Users**

In an average home, the three top indoor water users are the shower, toilet and washing machine. Replacing these with more efficient models (see table below) can save over 119,000 litres per annum for a 3 person household, representing a saving of around 50%.

**Water Devices**

If you are renovating your home, the Queensland Development Code Part MP4.1 requires that you upgrade toilets to 4 Star, showerheads and tapware to a minimum of 3 Star and install a hot water system that complies with the Queensland Plumbing and Wastewater Code.

Showerheads, tap aerators, toilets and appliances can be easily retrofitted. A cheap solution for reducing the water used in older toilets for flushing is placing a full water bottle in the cistern. When selecting new water appliances such as dishwashers or washing machines, choose high WELS (Water Efficient Labelling and Standards) rated appliances (see www.waterrating.gov.au for more details).

---

2. BlueScope Water, Advice from Nick Skutenko at TGBN Retrofitting Forum, 2012
3. Waterwise Queensland, Being waterwise in bathroom, laundry and kitchen
4. Based on 18minns total showering/day & 12 flushes
5. Stormwater Tank use, from a watercourse is 50 metres.
7. BlueScope Water, Advice from Nick Skutenko at TGBN Retrofitting Forum, 2012
8. Waterwise Queensland, Being waterwise in bathroom, laundry and kitchen
9. Based on 18minns total showering/day & 12 flushes
10. RPM Enviro, Advice from TGBN Retrofitting Forum, 2012
Creating a water efficient garden will save you thousands of litres of water per year and save money on your water bills.

WATER EFFICIENT GARDEN

When selecting plants and trees, choose native species which are adapted to our climate and hardier during the dry season, requiring minimal watering.

Deeper, less frequent irrigation can promote deep roots, and halve water use without changing any plants or reducing lawn area.1 Gradually reducing the amount of watering will allow plants to become more resilient during dry periods.

Drip irrigation on a timer is more water efficient than above ground irrigation as the water will not evaporate. Mulching will also reduce the amount of water lost through evaporation.

Greywater systems and rainwater tanks can also help with a water efficient garden. Grey water can be diverted to water hungry plants such as palms or fruit trees. Try a banana swale or water efficient garden. Greywater can be used to water lawns to reduce evaporation. Greywater can be used to water lawns to reduce evaporation.

Growing your own food can save you money and help the environment.

Stormwater management systems can encourage on-site water retention. Avoid the use of hard surfaces that divert water to stormwater drains, depleting the water table. Driveways can be constructed of permeable cells.

PASSIVE DESIGN

Landscaping can assist in cooling the home through shading and breeze filtering.

Landscaping for breezes

Summer breezes come predominantly from the north to north east with some from the south to south east. Winter breezes are predominantly from the south to south east with some south westers. Landscaping or strategically placed free standing walls can direct these cooling breezes into the home. When placing for shade be careful not to block breeze paths with dense planting.

Landscaping for shade

In far north Queensland the sun is at a high angle in summer so larger shade trees are a great option. The sun in summer rises in the south east and sets in the south west so is at a low angle in the early morning and late afternoon. Shading at these times is essential as it will stop your home heating up during the day and cool quicker in the evenings. Vertical and dense planting are ideal on the east and west areas to avoid heat gain.

Landscaping can provide beneficial shading to the roofs and wall of your home for little cost. Consider shading east and west facades through planting of shade trees. If you are considering installing solar power avoid shading on northern side as shade effects the panels’ performance. Consider the use of green roofs as an insulator which use recycled plastic cells to hold the earth and grass to your roof keeping the home cool.

Plants provide cooler shade than man-made structures due to the transpiration and evaporation from the leaves which provide up to 5°C temperature reduction.2 Unshaded hard surfaces adjacent to your home can increase heat entering your home by heating the surrounding air.

FOOD GARDENS AND PERMACULTURE

Using your backyard to grow fruit and vegetables can save you a lot of money and provide you with fresh, healthy food.

Divide your garden into zones according to ease of access and how often you would visit to harvest and maintain. Zone 1 is the kitchen garden, an area where herbs, salad plants and vegies are harvested daily and should be located as close as possible to the kitchen. The best solar aspect for a kitchen garden is to the north which works well with a good north facing kitchen and living area. Consider permaculture principles such as companion planting to reduce pests and using natural fertilisers and pesticides.

COMPOSTING

Compost systems range from barrel or drum systems, anaerobic (bokashi style) bins, worm farms and tumblers to traditional garden composting. These can reduce the amount of waste going to landfill. Make sure that you locate them away from bedrooms and living areas and cover to avoid attracting pests. Compost is great fertiliser and ideal for improving soil structure.

Worm farms contain composting worms that are surface dwellers and are usually reds, blues and tigers that require large amounts of organic matter to survive. Worm farms have a collector at the base to catch liquid to fertilise your garden and should be located in a shady area to protect them from drying out.

SWIMMING POOLS AND WATER FEATURES

Directing breezes across water provides a cooling effect. Locating your swimming pool to the north will mean that the water is warmer in winter (extending your swimming season) and will reduce evaporation of water and chemicals.

Install a pool cover

Installing a cover can reduce salt and chemical use by up to 50% and save up to 10,000L of water per month by reducing evaporation3, particularly in the dry season. A cover will also reduce the need for maintenance and cleaning. Ideally use water from your rainwater tank for filling the pool. Many households put an extra dose of chemicals in the pool at the beginning of the dry season, cover it and turn off the pump all together. A pool cover will also pay for itself in as little as 3 years due to reduced electricity consumption in pumping the pool when it is not being used.4

Energy efficient pool pumps and chemical free pools

Installing a quieter, energy efficient pool pump or retrofitting your existing pump on to automatic variable speed model can save you up to $3,000 per annum over 5 years.5

Install a pool cover, change to the off peak tariff and upgrade your pool filter for big energy savings

Reducing your pool filtering hours and converting your filter to the off peak tariff will reduce demand on the electricity grid, save you money on power and reduce the amount of chemicals needed. Filtration during the day creates water currents leading to greater evaporation of chemicals. Try reducing your filtering hours to work out the minimum needed for your system. In winter pools can run on as little as 4 hours a day but in summer, in the tropics, they may have to run longer due to the high water temperature and evaporation of chemicals.

Changing your pool filter from 8 hours to 4 hours a day on off peak could save you up to $500 per annum in electricity.6

1. Centre for Sustainable Arid Towns (2008) Sustainable Housing in Central Australia
2. Guide 4. Landscaping. An integral aspect of sustainability, Sandy McCaffs, Planning Services, Special Projects Unit, City of Townsville
3. www.dailypoolcovers.com.au 4. www.coolmob.org 5. Based on 1 kWhr average pool pump energy use and 22c and 9c per kWh for peak and off peak

Landscape and Surrounds

Growing your own food can save you money and help the environment.

Stormwater management systems can encourage on-site water retention. Avoid the use of hard surfaces that divert water to stormwater drains, depleting the water table. Driveways can be constructed of permeable cells.

Install a pool cover, change to the off peak tariff and upgrade your pool filter for big energy savings

<image>
Living Water

ENERGY EFFICIENT LIGHTING SPECIALISTS

Lighting is one of the most cost effective ways of improving energy efficiency in your home. Beacon lighting can save you money on your energy bills by upgrading your inefficient halogen or older style fluorescents to longer lasting energy efficient fluorescents or LED lighting.

Our expert staff can help find the best solutions for your home.

www.nqsolar.com.au

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES

Thank you to all our local sponsors who have helped make this guide possible

Naked Energy

greenbuild

LOCAL DIRECTORY OF SUPPLIERS OF SUSTAINABLE PRODUCTS AND SERVICES
Our organisation has been involved in many initiatives to promote sustainability throughout far north Queensland over our 30 year history. If you would like more information on our work, visit our website www.cafnec.org.au or call our office on (07) 4032 1746.