Sustainable housing in Central Australia
A guide to efficient use of energy and water for buyers, builders and renovators
This book has been produced to:

- Encourage energy efficiency in the residential sector as part of the Northern Territory Government’s commitment to managing the Northern Territory’s greenhouse gas emissions.
- Enhance the activities of Desert Knowledge Australia in promoting sustainability in desert Australia.

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SUSTAINABLE HOUSING IN CENTRAL AUSTRALIA

COMMON MYTHS

House design
Myth: Good design costs more to build.
Fact: Good design can cost far less through intelligent use of space, materials, orientation and site-specific features. Careful planning can be the key to savings.

Myth: Sustainable house designs look weird.
Fact: Any house style benefits from sustainable design principles. Many of the 1970s and ’80s housing commission homes in Alice Springs are well designed and oriented for our climate, yet do not look strange.

Myth: Sustainable design is for greenies.
Fact: Good design makes for comfortable, quality homes with lower ongoing energy bills. Everyone benefits from that.

Gardens
Myth: Only native gardens that use local species are water efficient.
Fact: Virtually any garden can be water efficient if plants are trained to have occasional deep drinks. There are many non-local plants that thrive with little water such as roses, bottlebrushes, trumpet vines and jacarandas.

Myth: Lawns are not compatible with water efficient gardens.
Fact: Lawns are an important part of many homes for play and space. They can be weaned off high water use through less frequent deeper irrigation. Converting some lawn area to gardens will definitely save water and require less mowing on weekends.

Myth: Rainwater tanks breed mosquitoes.
Fact: If a well-fitting mesh screen is placed over the tank opening, then mosquitoes cannot get in. All new rainwater tanks have such screens.

Energy
Myth: Why bother improving my hot house when air conditioning is cheap to run.
Fact: Coming home to a hot house each summer day becomes tedious and can be improved by simple actions such as shading a window. These actions reduce power bills and make a home more inviting to live in.

Myth: Compact fluorescent lights (CFLs) don’t fit in normal light covers.
Fact: CFLs are available in a wide range of designs and are suitable for an extensive range of fittings.

Myth: Many sustainable products are not available in Central Australia.
Fact: Most products can be ordered in by agents. However Central Australia’s small market and long transport distances can make the cost of individual orders high. There are a number of online stores that specialise in energy efficient products.

Water
Myth: Central Australia’s water comes from the Great Artesian Basin.
Fact: Virtually all Central Australian communities rely on localised underground aquifers for their water supplies. Some of these are renewed by rainfall, others are not (e.g. Alice Springs).

Myth: Water efficient showerheads clog quickly with scale and they give a terrible shower.
Fact: Clogging is a rare occurrence in any showerhead. Scale eventually causes some holes to squirt sideways in any type of showerhead and is easily fixed by cleaning with steel wool or unscrewing and soaking in vinegar overnight.

Many early model showerheads did perform poorly. New models must meet performance and comfort standards set by Standards Australia. It takes a few showers to get use to the lower flow, but it soon goes unnoticed.

Myth: Solar hot water systems don’t last long enough in the hard (mineralised) Central Australian water.
Fact: All hot water systems (solar, electric, gas) suffer from corrosion and scale deposition in Central Australia’s hard water. Solar systems have unique issues due to water getting hotter in summer than in thermostat-controlled electric/gas systems (affecting pressure relief valves in particular).

It is critical to have all hot water systems serviced regularly, with the frequency depending on the hardness of the water. In Alice Springs, a service every year should keep a solar system operating as long as an electric system (10-15 years) but in other communities with extremely hard water, it may only last five years or less.
WHY SUSTAINABLE HOUSING

Welcome
This booklet is a guide for buyers, builders and renovators to improve the sustainability of houses in Central Australia.

It shows how to make smarter building designs and informed purchasing choices as well as changes in behaviour and improved awareness to make homes more comfortable, more energy efficient, more water efficient and cheaper to run.

All this can be done without compromising people’s quality of life. Indeed quality of life is enhanced as understanding grows about how to live sustainably in Central Australia.

The sun is a great resource
Central Australia is one of the sunniest places on Earth. Smart homes already harness this free resource to improve their performance.

Well-placed shade keeps homes cooler in summer, whilst the winter sun is let into windows as a free source of heat.

Roof-top photovoltaic (solar) electricity systems can supply a significant portion of a home’s energy needs due to sunny days throughout the year.

Solar hot water systems can provide 95% of hot water in a water efficient house in Central Australia.

Global warming
Global warming (climate change) is occurring because of increased greenhouse gas emissions around the world. In Australia, houses create 20% of the country’s total emissions.

In Central Australia, CSIRO predicts that global warming will impact significantly in coming decades.

The region may become up to 5.2 degrees warmer by 2070 with up to 44% less rainfall. By 2030, the number of days over 35 degrees may increase from 90 now to 118.

New and existing homes will have to optimise their design and performance in preparation for these changes.

Energy and water use can be significantly reduced without compromising people’s lifestyles.

This booklet shows how to do it …

... so is energy
In Central Australia most energy is supplied by fossil fuels. Like the rest of the world, we need to reduce this consumption to help slow global warming and preserve future supplies.

Simple home changes such as adding insulation, installing solar hot water and planting shade trees can create big reductions in energy use and reduce your electricity bill.

Homes can do better
Water and energy use is high in Central Australian homes compared to the rest of the country.

This has come about because many homes and gardens are poorly designed for the desert climate and many residents could better adapt to local conditions.

Water is precious …
Everyone knows that water is a precious resource in Central Australia. Yet the region’s homes are the highest water users in Australia. In Alice Springs houses average 1920 litres of water per day, two-thirds of that going on gardens. This can be halved by modifying irrigation practices – without changing one plant or reducing any lawn area. Taking all residential properties, Alice Springs uses 535 kilolitres per household per year while many areas in Australia use less than 200 kL.

Many towns and communities use non-renewable underground water (e.g. Alice Springs). Smarter consumption in homes means future generations can also enjoy a secure water supply.

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Roof-top photovoltaic (solar) electricity systems can supply a significant portion of a home’s energy needs due to sunny days throughout the year.

Solar hot water systems can provide 95% of hot water in a water efficient house in Central Australia.

Become part of the solution
Join a growing band of householders and industry professionals who are actively modifying homes, gardens and lifestyles to be more sustainable in Central Australia.

Read on for how to do it …
**Electricity supplies**

Alice Springs uses gas turbines powered by natural gas piped from the Mereenie gas fields 200 km west of Alice Springs. This pipeline extends to Darwin.

Tennant Creek uses gas turbines fuelled by the same pipeline.

Yulara has gas turbines fed by trucked-in compressed natural gas.

Remote communities, resorts and properties and generally use diesel generators fuelled by trucked-in diesel. Hermannsburg, Yuendumu and Lajamanu use solar energy to augment their diesel power.

**Other energy.** Bottled LPG gas and wood are common for heating and cooking. Some suburbs of Alice Springs have reticulated natural gas. Many Aboriginal outstations and cattle stations have stand-alone solar power systems for houses.

**Water supplies**

Alice Springs uses 6000 year old water from the Roe Creek borefield 13 km south of town. It is pumped from 150 m underground and is dropping 1 to 2 m per year. It has only 5% recharge by rainfall, so is essentially non-renewable.

Tennant Creek draws from the Kelly Well borefield 15 km south of town. The extraction depth has remained around 15 m below ground for many years indicating recharge matches extraction. Mary Ann Dam is purely recreational.

Yulara draws from the Dune Plains Aquifer and extraction roughly matches recharge by rainfall.

Remote Aboriginal communities draw mostly from underground aquifers. Some are recharged by rain, others are not.

**Electricity use in homes**

Remote Central Australian communities had annual power consumption of 8600-14 200 kilowatt hours per year in 2004-2006 with peak demand in winter. Annual electricity consumption of houses in Alice Springs is approximately 8500 kWh per year compared to a national average of 6400 kWh.

A breakdown of consumption in Alice Springs is shown below.

**Water use in homes**

Alice Springs has the highest residential water use in Australia, 535 kilolitres of water per household per year or, for the total population, 858 litres per person per day. Water pumping requires significant amounts of energy, making its provision a significant greenhouse gas contributor for a house (0.89 kg CO2e/kL).

Most water goes to garden irrigation – one-third of Alice Springs’ entire water supply irrigates home gardens. Sustainable homes use half this water or less.

**Greenhouse gases**

Houses produce 20% of Australia’s greenhouse gases, adding to global warming. Alice Springs, Tennant Creek and Yulara are fortunate in using natural gas to generate electricity. This produces far less greenhouse gases than coal-fired power stations.

An average Alice Springs house produces 7 tonnes of greenhouse gases per year, whilst an energy efficient house can produce 2.6 tonnes.

**Energy and water bills**

<table>
<thead>
<tr>
<th>Use per year</th>
<th>Average house in Alice Springs</th>
<th>Efficient house*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>$1220</td>
<td>$532</td>
</tr>
<tr>
<td>Bottled gas</td>
<td>$570</td>
<td>$190</td>
</tr>
<tr>
<td>Water</td>
<td>$574</td>
<td>$354</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$2364</td>
<td>$1076</td>
</tr>
</tbody>
</table>

* For houses using bottled gas for space heating and cooking.

# For houses using bottled gas for space heating and cooking.

(p.19).
**Design for a desert climate**

Central Australia has a fierce five-month summer that, with climate change, is getting longer, so summer comfort should be a primary design goal.

Summer days are hot and dry so maximise shade and insulation. Most evenings cool off significantly so plan for cross-ventilation at night.

Winter days are mild and sunny so allow the sun into north facing windows to store heat in the floor and walls. Nights are very cold, so keep heat indoors by using curtains and pelmets, door seals and good insulation.

**Good planning / good buildings**

Poor design wastes space and ties up capital that could be spent on features such as rainwater tanks.

Good design creates a comfortable, quality living space with lower ongoing energy and water bills.

Many sustainability features such as orienting a house correctly cost nothing.

**Retain flexibility**

Ensure future opportunities are not compromised by up-front design decisions.

For example, keep bathroom and laundry pipes separate from toilet and kitchen pipes until they exit the house slab, allowing installation of a greywater reuse system in the future.

**Green home loans**

Some lenders offer reduced home loan rates for ‘green’ homes and reduced rates to purchase energy and water efficient hardware. These are available to Central Australian homeowners.

**Mortgage repayments**

A new or retrofitted sustainable home can have annual energy and water bills $1000 less than other homes.

If the saved $1000 is re-invested into the mortgage, then the mortgage could be paid off up to three years faster. Alternatively, up to $12,000 more could be borrowed initially whilst retaining the same payoff period. This could fund extra insulation or a rainwater tank during construction.

**Buyers value good design**

Good design and demonstrated low energy and water use may increase the value of a home.

In Alice Springs, a solar hot water system can add between $1000 and $2000 to a home’s sale price, justifying upfront installation costs.

**House energy rating schemes (HERS)**

HERS are computer-based programs that rate the thermal performance of planned or existing houses out of five stars. The rating is typically undertaken at the design stage. However, thermal and energy performance of a house can significantly differ from the rating obtained.

**BCA energy efficiency regulations**

Since 1 January 2003, the Building Code of Australia has set minimum energy efficiency requirements for new homes in the Northern Territory and other States. This covers insulation, window areas, natural ventilation and insulation of hot water pipes.

**4 REASONS TO MAKE A SMART HOUSE**

1. **Save construction $$$ with clever flexible floor plans**
2. **Get a green home loan with reduced interest rates**
3. **Lower your bills so there is more money for mortgage payments**
4. **Get a higher resale value**

Buyers value good design

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In Alice Springs, a solar hot water system can add between $1000 and $2000 to a home’s sale price, justifying upfront installation costs.
What is passive design?
Passive design takes advantage of climate conditions and appropriate building materials to keep a home cool in summer and warm in winter.

Elements of passive design
Face the house north to capture winter sun.
Minimise western windows (p.7).
Shade east and west walls in summer (p.7).
Ensure north eaves allow/exclude seasonal sun.
Use internal thermal mass (p.7).
Maximise insulation (p.8).
Use curtains/blinds and pelmets on windows (p.7).
Use a light coloured, ventilated roof (p.8).
Use door seals on external doors.
Draught-seal chimneys, exhaust fans and vents.
Optimise cross-flow ventilation.
Use ceiling or pedestal fans in bedrooms (p.9).
Shut doors of unoccupied rooms.
Plan the garden to aid cooling and heating (p.15).
Use shade trees to good effect (p.15).

Orientation and sun path
Face the long axis of a house as close to north as possible so the hot morning and afternoon sun hits small walls on the east and west.
On the north side, use appropriate width eaves to let winter sun through windows for passive indoor heating, while shading the higher summer sun out. Seasonal sun angles can be found using web calculators.

Cross-flow ventilation
Cooling breezes generally come from the south east in Central Australia. Open doors and windows to optimise cross-flow ventilation on summer evenings. Louvre windows are excellent for this.

Seal gaps
Seal gaps underneath and around external doors to stop the free-flow of hot and cold air. This can reduce heating and cooling costs by 25%. Inexpensive door and frame seals can be bought from hardware stores.
Unflued chimneys, open air conditioner vents and bathroom exhaust fans also allow free air movement. Install a $25 ‘draught-stopper’ onto existing exhaust fans. Seal chimneys if unused and place a winter cover over the evaporative air conditioner or its internal vents.

Embodied energy
This is the energy used to make and transport all the materials in a house. CSIRO estimates it is equivalent to 15 years of operational energy in Australian houses. Analysis for Alice Springs by the Centre for Sustainable Arid Towns shows this figure is 25 years reflecting the high energy cost of remote site construction.
Different materials have different embodied energies. For example, rammed earth walls that use local dirt will have lower embodied energy than concrete blockwork walls that use imported cement.
To minimise the proportional impact of embodied energy, design small, long lasting and adaptable buildings.
WALLS AND WINDOWS

External walls
For best thermal performance balance the area of glass, wall material and insulation.

Single layer concrete blockwork walls are common in Central Australia but have poor insulating properties in full sunlight (see below). Avoid for east and west walls, and ensure north walls are shaded from September to April.

Stud frame walls gain and shed heat quickly and should be well-insulated with foil and batts during construction. For metal frames, 10 mm polystyrene isolating strips can be used between the frame and cladding to limit heat transfer.

‘Reverse brick-veneer’ walls combine a heavy material inside and light cladding outside with a gap or insulation between. Both wall types are suited to full sun.

Improving blockwork walls
If western blockwork walls are exposed to full sun, absorbed heat takes around 8 hours to pass through into the house. Monitoring at one local house showed internal west wall bedroom temperatures were 38 ºC at midnight in summer.

For existing walls, improvements can be gained by 1) painting the outside wall a light colour to reflect heat; 2) fitting a ‘skin wall’ (see diagram) to the outside using battens and cladding to permanently shade the wall; 3) constructing deep shade via a carport, verandah or similar; or 4) adding an external insulation layer.

Windows, frames and heat transfer
There are literally thousands of window and frame combinations available for all thermal situations. Consult a window specialist for expert advice.

Standard single-pane windows with aluminium frames readily allow heat and cool to pass through the glass and frame, making them poor thermal performers. Provide external shading, curtains/blinds and pelmets to optimise performance.

Heat loss through various windows

<table>
<thead>
<tr>
<th>Type</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unprotected single glazing</td>
<td>100%</td>
</tr>
<tr>
<td>Vertical or venetian blinds</td>
<td>100%</td>
</tr>
<tr>
<td>Unlined drapes/Holland blinds, no pelmet</td>
<td>92%</td>
</tr>
<tr>
<td>Double glazing</td>
<td>69%</td>
</tr>
<tr>
<td>Heavy lined drapes, with pelmet</td>
<td>63%</td>
</tr>
<tr>
<td>Double glazing, heavy drapes, with pelmets</td>
<td>47%</td>
</tr>
</tbody>
</table>

Data from ‘Your Home’ manual

Window Energy Rating Scheme (WERS)
WERS rates windows, frames and skylights for their energy/thermal efficiency.

Visit www.wers.net for comprehensive information on window options for all scenarios.

External shading for direct sunlight
If summer sun is directly hitting a window it is like having a bar radiator inside the room. The best remedy is to externally shade that window rather than using internal curtains or blinds.

Use pull-down shutters, awnings or blinds, or alternatively construct an eave, shadecloth, carport, vine or other structure that provides shade on the window and surrounding walls.

Internal curtains, blinds and pelmets
These are critical to stop winter heat escaping at night and summer heat entering during the day.

Ensure curtains/blinds rest snugly against window frames and use pelmets at the top to stop warm indoor air circulating past cold window panes.

Vertical and venetian blinds perform poorly compared to holland blinds or lined curtains.

Targeting the living room(s) that receive cooling and heating with ceiling insulation and close-fitting curtains can significantly reduce energy use.

Indoor ‘thermal mass’ walls
Internal ‘thermal mass’ walls help buffer large daily temperature changes during summer and winter, as do concrete floor slabs.

In summer they soak up daytime heat, keeping the house comfortable. At night use cross-ventilation to shed this heat from the house.

WALLS THAT WORK IN THE DESERT …
… balance the glass area, wall materials and insulation.
This differs for north, south, east and west walls!

WINDOWS CAN BE FRIENDS OR FOES …
Keep summer sun off windows.
Use curtains or blinds on winter nights.

THERMAL MASS vs. INSULATION
Thermal mass walls (e.g. brick, blockwork) store and re-radiate heat while insulation stops heat getting in or out.

THESE ARE VERY DIFFERENT.
**Insulation types**

There are broadly three types of house insulation:

- **Bulk insulation** includes batts (fibreglass, wool, polyester), foam panels and pump-in shredded paper. Insulation traps air to slow heat flow and typically work well in summer and winter.

- **Reflective foil insulation** reflects radiant heat from its shiny surface. It requires at least a 25 mm air gap next to the shiny surface to work optimally.

- **Composite batts** are a mix of the above, including batts with foil surfaces, bubble wrap sandwiched between foil and other combinations.

**What insulation is best?**

Good insulation is critical to the comfort of houses in Central Australia, particularly in summer.

For ceilings, the common Central Australian combination of minimum R3.3 batts against the ceiling and reflective foil under the roof works effectively for cavity roofs and cathedral ceilings.

For stud walls use minimum R2.5 batts and a reflective foil in the frame cavities.

For best effect, insulation should be combined with light coloured roofs and walls, roof ventilation, shading and thermally efficient wall materials. In winter, roof vents may be counterproductive and may need to be covered.

Thermal breaks are very important in steel clad buildings.

**Correct installation is vital**

Poor installation can drastically reduce insulation performance.

Reflective foil requires a 25 mm sealed air gap next to the shiny surface. If placed directly against roof sheets heat will pass straight through.

For batts, any gaps left by poor installation allow substantial heat transfer in and out of rooms. Ensure tradespeople re-lay batts properly after completing maintenance jobs.

**Roof colour and ventilation**

Light coloured roofs reflect far more heat than dark roofs. One monitored roof in Alice Springs of white painted corrugated iron was 45 °C underneath on a 38 °C day when neighbouring dark green, maroon and unpainted grey sheets were 70 °C. Rooms were up to 4 °C cooler even though roof batts and foil were used.

Light tones of most colours work almost as well as bright white and are easier on the eye. If painting a roof, standard paints perform well and are far cheaper than reflective paints.

Ventilate the roof space to release trapped summer heat. Use perforated eaves and 'whirly gig' ventilators to optimise air flow.

**Case study**

Six different ceiling insulation combinations were installed and monitored at the Alice Springs Cool Living House between 2002 and 2004.

The best overall performance in summer and winter was by standard R3.3 batts against the ceiling and reflective foil under the roof sheets.

Where ceiling batts were absent (foil-only) room temperatures were up to 4 °C warmer in summer.

Bubble wrap insulation performed almost as well as batts and foil, while two layers of foil did not work as well in winter. See www.alec.org.au for details.
Cooling choices in Central Australia
Options are ceiling/pedestal fans, evaporative air conditioners and refrigerative air conditioners (reverse cycle).

The need for cooling is significantly reduced by good house orientation, insulation, shade, curtains, awnings, door seals and other features.

Evaporative air conditioners
How they work. Evaporative air conditioners suck air through water-soaked pads, evaporating the water and cooling the air before sending it to rooms.

Bleed off. Set the bleed rate at 5-8 litres per hour in Alice Springs to slow calcium build-up on pads. Reuse in the garden. Bleed rates may need to be higher where water is more mineralised.

Water consumption. 20-30 litres per hour are evaporated to create cool air, so daily consumption can be up to 840 litres if run all day. Turn off the air conditioner at night, open windows and use fans to stay cool.

Power consumption can be low, having the fan speed set at low costs around five cents per hour. However this can add up to $180 if run continuously all summer.

Maintenance. Have the pads descaled and fan or pump motors serviced every two years. Locate at ground level for easier maintenance.

Cooling different rooms. Cool air can be directed to distant rooms by opening windows in those rooms and closing all others.

Ceiling or pedestal fans
These are relatively cheap to buy/install and cost less than one cent per hour to run. Use them in bedrooms overnight instead of the air conditioner.

Refrigerative air conditioners
How they work. Refrigerative air conditioners work like a fridge by cooling down a block of air inside the house. Reverse cycle models also heat in winter. Rooms should be well sealed, insulated, with doors and windows kept closed.

Efficient models. Fixed split systems with inverter motors are generally the most efficient. Before buying, compare the energy star rating labels or go to www.energyrating.gov.au to compare models. Go for 4 stars or more.

Thermostat. Set at 25–27 °C in summer and 18-20 °C in winter. Each extra 1 °C of heating or cooling can increase energy use by 5-10%.

Power consumption. Even energy efficient models cost up to 30 cents per hour, so use them wisely.

Sizing the system. Use air conditioner suppliers who assess the thermal efficiency of the house before recommending the system size.

What type is better?
Unless large ducted systems, refrigerative air conditioners only cool the room where they are located and work best when the room is closed up. Evaporative models require some doors or windows to be ajar so air can be blown through. Therefore people who prefer open rooms or have doors that are opened often (kids!) may prefer an evaporative model.

In a well-insulated house, reverse cycle refrigerative air conditioners will most likely be cheaper to buy, install, run and maintain than a ducted evaporative air conditioner and gas/wood heater.

However, refrigerative air conditioners rely entirely on electricity to run so have a significant peak power demand in mid-summer.

On the other hand, evaporative air conditioners also have sustainability issues – water is non-renewable in many Central Australian towns and they require significant ongoing maintenance.

Humid summers
Evaporative air conditioners do not perform well in the wet summers and are ineffective in cooling when humidity is greater than 40%.
HEATING

WARMING THOSE WINTER NIGHTS...

... install insulation, door seals and curtains/blinds.

If heating with gas, use a flued gas heater.

If heating with wood, use a reputable supplier!

If heating with reverse cycle air conditioning, choose an energy efficient model.

Cover evaporative coolers in winter to prevent heat loss.

### Heating options

<table>
<thead>
<tr>
<th>Heater type</th>
<th>Running costs</th>
<th>Greenhouse emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood heater</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Gas heater</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Reverse cycle air conditioner</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### Minimal heating

Heating can be significantly reduced in Central Australia through good house design, insulation, sealed door gaps, winter sun through windows, closed curtains at night and wearing warm clothes.

Heat shifters are a simple way to move heat from one room to another (see diagram).

### Gas heaters

Gas has relatively low greenhouse gas emissions. New gas heaters have energy rating labels. Choose a high star rating and ensure it is thermostatically controlled.

### Health concerns with unflued gas

‘Given the high rate of childhood asthma in Australia, the use of (unflued gas heaters) should be minimised’.


Recent research shows unflued gas heaters increase air pollutants indoors (nitrogen dioxide and carbon monoxide) and increase respiratory symptoms for occupants.

If using an unflued gas heater keep rooms well-ventilated; minimise the time of use; don’t use where people are asleep; choose electronic ignition; have an auto-shutdown when fresh air is low; and regularly inspect and maintain the heater.

### Minimal heating

Heating can be significantly reduced in Central Australia through good house design, insulation, sealed door gaps, winter sun through windows, closed curtains at night and wearing warm clothes.

Heat shifters are a simple way to move heat from one room to another (see diagram).

### Wood heaters

Contrary to some perceptions, wood heating can provide a lower greenhouse gas emission result if comparing it with fossil fuel generated electricity.

Slow combustion wood heaters are up to 70% efficient, unlike open fireplaces where 90% of heat rises up the chimney.

Wood heaters are most suited to large spaces. Select models with an inbuilt fan to move heat into the room.

Wood should be well-seasoned and used sparingly due to its slow growth. Purchase from licensed wood merchants.

Smoke emissions can affect neighbours health, so keep the flue open for a hot burn that minimises smoke and avoid slow, smoky fires overnight.

### Reverse cycle air conditioners

See previous page for details on efficient usage.

Set the winter thermostat at 18–20 °C. Each degree can save 5-10% of running costs.
**Lighting**

To optimise the functionality and energy use of lights 1) make use of natural daylight; 2) use the best light for the task; 3) choose energy efficient models; and 4) have individual switches to optimise control.

**Types of lights**

**Fluorescent lights** are the most energy efficient and cheapest to run. There are two main types - compact and long tubes.

**Compact fluorescent lights** (CFLs) come in two types of light – ‘warm white’ (incandescent globes) and ‘cool daylight’ (starker fluorescent tubes). They last around 15,000 hours and give best value for money (see table below). Their physical length has reduced to that of a ‘normal’ globe so they fit anywhere that a normal globe does.

**Halogen lights** are generally used as downlights. ‘Low voltage’ versions are not low energy users. Up to six halogen lights may be needed compared with one pendant light for normal room lighting. CFL replacements for halogen downlights that use only 11 watts are available.

**Incandescent (‘standard’) globes** are cheap to buy but expensive to run and have a short life (about 1000 hours). They are the least desirable option.

**Lifecycle cost of lights**

<table>
<thead>
<tr>
<th>Light</th>
<th>20 watt</th>
<th>65 watt</th>
<th>100 watt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compact fluoro</td>
<td>Halogen</td>
<td>Incandescent</td>
</tr>
<tr>
<td>Purchase cost</td>
<td>$20</td>
<td>$20</td>
<td>$5</td>
</tr>
<tr>
<td>($4x5 lamps)</td>
<td></td>
<td></td>
<td>($0.50x 10 globes)</td>
</tr>
<tr>
<td>Running cost</td>
<td>$30</td>
<td>$97</td>
<td>$150</td>
</tr>
<tr>
<td>(10,000 hrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average life</td>
<td>10,000 hrs</td>
<td>200 hrs</td>
<td>1000 hrs</td>
</tr>
<tr>
<td>Total costs</td>
<td>$50</td>
<td>$117</td>
<td>$155</td>
</tr>
<tr>
<td>(8000 hrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All these lights have equal lighting output.

**Stand-by power**

Examples of stand-by power are the red light on a turned-off TV or the digital clock on a microwave.

Stand-by power can use 12% of total household consumption. Turn off appliances at the wall to stop this. See www.energyrating.gov.au for more details.

**White goods**

All white goods have Energy Rating labels to allow comparison of equivalent models. Before buying go to www.energyrating.gov.au to compare them all. Check www.wsaa.asn.au for water-efficiency ratings.

**Fridge/freezers**. A 4-star fridge/freezer uses $600 less electricity than a 1-star model over 10 years. Place in a cool, ventilated spot and keep seals airtight. Turn off second fridge if not being used as they can cost $250 per year to run.

**Clothes dryers**. These are rarely required in Central Australia’s dry climate and can cost $100 per year to run.

**Washing machines**. Front-loaders generally use half the water and energy of equivalent top loaders, saving around 20,000 litres of water and $50 of electricity per year. Wash full loads.

**Dishwashers**. Efficient models save $50 per year in energy. Several use less water than handwashing.

**Air conditioners**. Compare the energy ratings of different refrigerative air conditioners. See page 9 for more.

**Computers**

Activate the power management feature on computers so the hard-drive and screen go into sleep or standby mode when not used. Screensaver patterns do not save power.

**Comparing products**

The Australian Consumers Association regularly tests home appliances for performance, energy and water efficiency and other aspects.

Results are published in the Choice magazine, available from libraries, newsagents or online at www.choice.com.au.

**SEE THE LIGHT …**

1. Make use of natural daylight
2. Use the best light for the task
3. Choose energy efficient models
4. Have individual light switches to optimise control

... compact fluorescent globes are very energy efficient. Save $15 per light per year!

**SOME WHITE GOODS ARE NOT SO GOOD…**

Choose models with high energy star ratings.

Save hundreds of $$$ in electricity (and water) over their working lives.
How grid connected solar works
Installing a grid-connected photovoltaic (PV) electricity system can turn your house into a mini power station. The system works by having an array of solar panels on the roof connected in series.

The panels produce DC power, this type of power is used in your car or battery driven appliances. For this power to be used in the home it first transformed into 240 volt AC power by a gadget called an “inverter”. The inverter feeds into your household switchboard.

Once connected, this PV grid connected system starts producing 240 volt electricity and when a surplus is made it is exported into the main electricity grid to be used by other users.

The Solar Region
Central Australia is amongst the sunniest places on earth with long cloudless days and intense sunlight.

Power and Water, Telstra and remote Aboriginal communities are big users of solar power in remote locations and Central Australian communities resulting in the largest uptake of solar energy per person in the world.

At Kings Canyon Resort, Power and Water has installed the largest flat-plate solar array in Australia at 225 kW (peak), enough to power over 100 energy efficient homes.

Costs
It costs around $8500 to install a 1.5 kW grid-connected system1 including rebates from the Australian Government2.

This will generate around 2250 kWh per year3, enough to power an energy efficient house.

Manufacturers claim installation costs are reducing due to technological and assembly improvements.

Energy efficiency is critical
Due to the high cost of grid-connect systems, it is financially wiser to optimise the energy efficiency and thermal performance of a house before investing in solar power.

This includes solar hot water, efficient lights and appliances, evaporative air conditioning, insulation, shading of walls and windows and good use of thermal mass.

Alice Springs
One 3-bedroom house in Alice Springs has a grid-connected system of twelve 175 W fixed panels. Installation cost was $25 500 in 2001 (heightened cost due to oversized inverter). It generates around 3150 kWh per year or 60% of the house’s total energy use.

Alice Springs Solar Cities Consortium will be encouraging energy efficiency and photovoltaic systems for both houses and businesses from 2008.4
Perfect sun for solar hot water

Central Australia is one of the sunniest locations on the planet – ideal for solar hot water.

The sun provides over 95% of hot water in average homes using water-efficient hardware.1

Around 60% of homes in Alice Springs already use solar hot water systems successfully.2

Are solar systems cost-effective?

Yes. An appropriately sized and maintained solar hot water system needs boosting only twenty times per year in Central Australia (if water-efficient hardware is used).

This costs around $10 per year in electricity compared to $325 for an electric hot water system.3

Choosing and installing a solar system

Common 300-litre two-panel systems are well-suited for houses. Use 180-litre systems on flats.

Place panels on the north roof where possible.

For electric hot water systems, adjust thermostats to 60 °C as higher settings use too much electricity and lower temperatures may breed bacteria.

Rebates

Rebates are offered for solar hot water systems through a national scheme (www.orerr.gov.au) and are paid through Power and Water or the retailer/installer. The rebate value varies and some shopping around is advised. In 2007 a typical rebate was worth $700.

Additional local rebates may be available.

Contact the Arid Lands Environment Centre to check.

Managing scale

Central Australia’s hard (mineralised) water tends to scale-up the heating/booster elements and sacrificial anodes of hot water tanks, similar to the inside of a kettle. This reduces the efficiency of systems, requiring more energy to heat the same water. See page 2 ‘Common Myths’ for more details.

It is critical to have ALL hot water systems serviced regularly, with the frequency depending on the hardness of the water. In Alice Springs, a service every year should keep a solar system operating as long as an electric system (10-15 years) but in other communities with extremely hard water it may require more regular servicing.

Solar saves greenhouse gases

Installing a solar system is the most effective way to save greenhouse gases in a house. It may save 1 tonne of greenhouse gases per year on average,4 or a 20% reduction in emissions.

If the remaining 40% of Alice Springs’ dwellings converted to solar hot water, the greenhouse gas savings would be equivalent to removing 500 cars from the road.5

Solar booster control

Energy consumption of solar hot water systems is very dependent on controlling the electric booster which may come on at inappropriate times – such as after the morning showers and before the sun becomes intense. As off peak power is not available in Central Australia and hot water metering does not take place, electric boosters can use significant amounts of energy without the resident’s knowledge. Take control.

Manual on/off switches are common in older systems. When on, this booster effectively turns the solar hot water system into an electric water heater. Continue with this option if you are mindful of switches.

One-shot-relay. The relay’s button is pushed and stays on until water reaches the pre-set thermostat temperature. Electric power is thus only applied when it is needed such as during cloudy periods or occasions of high demand. From $200 installed.
Indoor water use

The following pie chart shows average indoor water use for single residential houses in Alice Springs.

Showerheads

Water-efficient showerheads are the quickest and most-effective way to save water indoors. They cost from $35 and save around 50 litres for a 5-minute shower or 55 000 litres per year in a 3-person house. They come in a range of flow rates from 6 to 12 litres per minute (standard roses are 18 litres per minute). If electric hot water is used, changing to a water-efficient showerhead can save $80 per year in water heating costs.

Unlike past models, all must now meet comfort and performance standards as well as water efficiency standards, so they give a very satisfactory shower.

Toilets

Dual flush 6 / 3-litre toilets are mandatory for new homes. Lower flush 4 / 3-litre toilets are also now available.

For existing 11-litre single flush toilets, a dual flush cistern can be retrofitted but may be limited to 9 / 4.5-litres due to pedestal design limitations. This will still save 20 000 litres per year.

Dry composting toilets are currently not allowed in sewered areas of the Northern Territory but individual approval can be sought from the Northern Territory Department of Health and Families.

Dishwashers

Water-efficient models can use less water than hand-washing, as low as 15-litres per cycle. Check the Choice magazine (June 2004) for their cleaning performance.

Rebates

The NT government offers rebates on some indoor water saving products. See www.nt.gov.au/waterwise

Washing machines

Front-loaders typically use half the water and energy of top loaders – around 60 litres compared to 120 litres per wash. This can save up to 22 000 litres per year if washing every day. Check the Choice magazine (February 2004) for comparative performances or check water efficiency ratings at www.wsaa.asn.au and www.waterrating.gov.au

Taps

Use screw-on tap aerators to reduce flow by 50% in non-volume taps (bathroom basin and kitchen sink). These cost around $6 if tap has an existing thread.

Single-lever mixer taps can waste lots of hot water when not needed. Newer versions only draw hot water from left of the middle position.

If a tap is left dripping, hard (mineralised) water will quickly eat a groove in standard brass tap seats causing an ever-increasing leak. Inexpensive DIY re-seating tools are available from plumbing and hardware stores.

Water Efficiency Labelling Scheme - WELS

WELS provide a graphical and numerical representation of water efficiency on most appliances.

Compare models in the shop, or preferably check all available models at the Water Services Association of Australia website (www.wsaa.asn.au) before deciding on your preferred model.

Impacts of scale

Tap aerators, shower heads and kettles can be affected by scale from hard (mineralised) water in Central Australia.

Scrub off the scale with steel wool or soak in vinegar or a brand-name scale remover overnight.
WATER EFFICIENT GARDEN

Garden water use is too high
Garden water use is the least sustainable aspect of Central Australia’s houses.
Garden irrigation averages 1330 litres per house per day in Alice Springs’ or 65% of total household use.
That means one third of Alice Springs’ entire water supply is used on home gardens. This is not sustainable.
In comparison, Melbourne houses average 151 litres per day on their gardens.

Can watering be reduced?
YES.
Most plants receive more water than they need to remain vibrant, mainly through too frequent watering (daily is common). Deeper less frequent irrigation encourages deep roots and can halve water use without changing any plants or reducing any lawn area.
Greater savings are possible by reducing lawn areas, planting arid-adapted species and using mulch, tap timers, drippers and stormwater harvesting.

Plan changes to the garden
Create a plan for modifying the garden then budget to do one thing at a time. Fairly soon a more water efficient garden will emerge that requires less work, is more robust and cheaper to run.
Sketch a plan of your garden and current watering arrangements. Take it to irrigation shops, nurseries or landscape gardeners for ideas to reduce irrigation and maintenance needs.

Arid zone watering. How to create a waterwise garden in Central Australia
An estimated 80% of Central Australian gardens are over-irrigated. This is often due to timers or irrigation controllers being set on for too long.
It takes time to wean plants off a high water regime. Gradually reduce the time and frequency of irrigation, accounting for seasons.
Get the booklet ‘Arid Zone Watering’ from Power and Water for recommended irrigation times.

Rebates
The Northern Territory Government offers rebates on some outdoor water saving products. See www.nt.gov.au/waterwise

Great plants for Centralian gardens
The following are either local native plants or non-native ‘heritage’ plants that are proven to grow successfully in Central Australia with limited water.

Trees
- Ghost gum: Corymbia apparerinja
- Whitewood: Atalaya hemiglauca
- Coolibah: Eucalyptus intertexta
- White cypress pine: Callitris glaucophylla
- Mulga: Acacia aneura
- Blue Mallee: Eucalyptus gamophylla
- Hibiscus*: Hibiscus rosa-sinensis
- Jacaranda*: Jacaranda mimosifolia

Shrubs
- Witchetty bush: Acacia kempeana
- Inland teatree: Melaleuca glomerata
- Desert bottlebrush: Melaleuca fauicola
- Native fuchsia: Eremophila sp.
- Cassias: Senna species
- Roses*: Rosa varieties

Vines and creepers
- Bougainvillea*: Bougainvillea x buttiana
- Trumpet vine*: Campsis grandiflora

Ground covers and grasses
- Ruby saltbush: Enchylaena tomentosa
- Rock morning glory: Ipomea costata
- Kangaroo grass: Themeda triandra
- Native petunia: Diptercanthus australasicus
- * Non-natives

For a complete plant list get ‘Local Plants for Central Australian Gardens’ from the Alice Springs Australian Plant Society.

Gardening information
Information books include ‘How to Create a Water Wise Garden in Central Australia’ by Power and Water, ‘Gardens in the Desert’ by Arid Lands Environment Centre and ‘Native plants for Central Australian Gardens’ by Greening Australia.
Specialist irrigation shops are very helpful at planning irrigation systems.
Charles Darwin University in Alice Springs offers a range of day and night courses related to water conservation in the home garden. These are offered to horticultural students, home gardeners and members of industry.
Plant displays can be viewed at the Alice Springs Desert Park, Olive Pink Botanic Garden and at open days in home gardens.

9 SIMPLE WAYS TO SAVE WATER IN THE GARDEN …

1. Wean plants off excess irrigation
2. Use native or desert-adapted plants
3. Reduce lawn area to a functional size
4. Use drip irrigation systems
5. Zone the garden into different water use areas
6. Mulch soils to protect from evaporation
7. Capture stormwater in the garden
8. Fix leaking taps
9. Use tap timers or auto controllers

… and save 250 000 litres of water per year!
1. Air conditioner
   Use bleed-off water on salt tolerant plants.

2. Lawn
   Reduce lawn area to a functional size. Long, infrequent watering promotes deep root growth.

3. Tap timers
   Use tap timers or auto controllers to stop overwatering. Adjust the times seasonally and as plants mature.

4. Greywater
   Send washing machine water to tunnels or mulch under trees.

5. Drip irrigation
   Use drippers for accurate water delivery and deep root growth. Use in early mornings or evenings.

6. Zoning
   Group plants according to their watering needs.

7. Shade trees
   Shade walls and windows with suitable trees, shrubs or vines.

8. Stormwater
   Divert roof water to the garden. Construct a depression, contour bank, creek or rock soak to retain water.

9. Native plants
   Native plants are most adapted to the climate, including long hot spells and severe frosts.

10. Mulch
    Use mulch to reduce evaporation and provide organic matter to the soil. Mulch can be organic, pebbles, chip bark or other groundcovers.
GREYWATER AND RAINWATER

Reusing greywater
Greywater is all household wastewater except for toilet water and can be reused onsite with care. Speak to a plumber about options as approval is required from the Northern Territory Department of Health and Families.

Bathrooms and laundries produce around 320 litres per day of greywater. Do not reuse kitchen greywater, as it is too messy.

Outdoor reuse
Outdoor reuse is ideal for Central Australia as gardens require irrigation all year. Target fruit trees and shade trees via subsurface disposal.

Indoor reuse in toilets and washing machines has been achieved but requires significant treatment. For examples, see the ‘Sustainable House’ book and the ‘Wattworks’ toilet flushing system. Approvals must be sought from the Northern Territory Department of Health and Families.

Outdoors. Most Centralian gardens require watering all year unlike wetter climates. Targeted outdoor greywater reuse is ideal as gardens generally need far more water than available as greywater (1330 vs. 320 L/day). Only minor pre-treatment is needed.

Reuse systems
Many greywater reuse systems are in use throughout Australia ranging from pump-out tanks to simple diverters. Speak to plumbing supply shops for options. The Northern Territory Government lists approved sytems and offers rebates.

Reuse washing machine water
Greywater from wash and rinse cycles is generally suitable for plant irrigation. The following diagram identifies potential elements of a greywater system.

Detergents and soaps
For laundry detergents, minimise salt and phosphorus content. Choose liquid concentrates with a ‘No P’ (phosphorus) label. The majority of soaps and shampoos won’t harm gardens or plants.

Regulation and Rebates
Regulation and rebate schemes for greywater and rainwater systems are changing rapidly and it is important to check with relevant local agencies.

Rainwater harvesting
In Central Australia, rainfall is too low and sporadic to supply all indoor and garden needs. However, enough rain falls for drinking, targeted indoor use or supplementary garden irrigation. A 9 000-litre tank will provide around 26 000 litres of rainwater in an average rainfall year or 10% of a water-efficient household’s needs.

Supplying hot water
Targeting rainwater to a hot water system may provide 50% of a home’s hot water and reduces scale in the hot water tank.

When the rainwater tank empties there are two options to swap to mains water: 1) an automatic switching controller that bypasses the tank; or 2) an automatic mains water top-up device.

Choosing a tank
Concrete, plastic and galvanised steel tanks all keep quality water. Tank shapes include modular slim-line versions and underfloor models.

A 500-litre tank adequately provides for drinking and cooking. A 9 000-litre tank is well-sized for hot water or other indoor uses. Smaller tanks empty too rapidly and bigger tanks are too tall for run-off from gutters.

Regulation and Rebates
Regulation and rebate schemes for greywater and rainwater systems are changing rapidly and it is important to check with relevant local agencies.

WATER HARVESTING AND REUSE ...
Rainfall is infrequent, but can supply 10% of a house’s needs.

You can feed rainwater into the hot water system.

Greywater happens every day ...
Reuse bathroom and laundry greywater in the garden – often over 300 litres per day!
Staying healthy indoors
Many Australians spend 90% of their time inside, much of that at home. Indoor chemicals, bugs, pollutants and some hardware can affect the health of occupants in subtle or significant ways.

Pollutants

Gas cookers and unflued gas heaters produce carbon monoxide and other harmful gas (see p.10).
Dust mite faeces readily become airborne and contain allergens that affect humans.
Cockroach allergies are common.
Mould can produce large numbers of spores that are allergens.
Pesticides add to household chemical loads.
Pets are a common source of home allergens.
Passive smoking is known to cause lung cancer, increase asthma, and irritate eyes, throats and more.
Cleaning products can introduce a myriad of chemicals into a home.
Carpets when new can off-gas various pollutants.
PVC pipes and cables can create dioxins and hydrochloric acids in a house fire.
Pressed wood products including MDF (medium density fibreboard) and particleboard use formaldehyde-based adhesives that can irritate eyes, throats and trigger asthma.
Paints and timber finishes often contain volatile organic compounds that can cause nose and throat irritations.
Asbestos can be dangerous if disturbed or old.
Termite treatment residues can persist in soils from past use of organochlorins.

Controlling pollutants
The two main control methods are to eliminate individual pollution sources and/or improve ventilation to flush airborne pollutants outside.

Increasing ventilation includes opening windows, using bathroom exhaust fans and choosing evaporative air conditioners over refrigerative units.

Rules of rubbish
1. Refuse excess packaging and paper.
2. Reduce packaging by buying in bulk. Repair appliances instead of replacing them.
3. Re-use containers, building materials, clothes, etc.
4. Recycle containers, old appliances, building materials, toys and clothes. Have a lawn sale.

Organic recycling
Green waste and food scraps comprise around 50% of household rubbish. This can all be reused on the garden as mulch and compost.
Composting can be done in a simple composting bin where food scraps and green waste are mixed with soil, watered and turned for a few weeks.
Worms can eat their body weight every day and quickly break down kitchen scraps (except citrus and onions). Worm farms are available at hardware stores and nurseries or can be homemade.

Cans, bottles and paper
Long travelling distances to markets limit commercial recycling opportunities in the region.
Alice Springs Town Council has an updated list of what and where to recycle in the town. Some businesses take glass and aluminium cans.
Yulara recycles bottles and cans via drop-off bins.
Tennant Creek Town Council can indicate recycling opportunities in that town.
Most Aboriginal communities have minimal recycling schemes for cans, bottles or paper.
CASE STUDY – ALICE SPRINGS COOL LIVING HOUSE

The house
In November 2002 a 1970s ex-Housing Commission home in suburban Alice Springs was fitted with energy and water efficient products. Its performance was closely monitored.

The owners continued to live normally in the house (2 adults, 2 children).

Energy and water use fell to half of an average home.

The house was opened monthly for public tours and was tagged the ‘Alice Springs Cool Living House’.

Benefits of changes
Changing from electric to solar hot water saved around $325 in electricity costs.

The evaporative air conditioner was used for only 500 hours in summer compared to 2420 hours in average homes.

Gas use fell from six to two bottles for heating/cooking due to added insulation, blinds and door seals.

Garden water use was one third of average gardens yet maintained a lush, functional space. Winter use was higher than in summer due to a winter vegetable garden.

Around 37 000 litres of greywater was reused from the washing machine to subsurface tunnels with no maintenance, odours or nuisance.

Painting the roof white reduced under-roof temperatures from 70 °C to 45 °C and inside temperatures by 4 °C at a cost of $200 for paint and rollers.

Insulation trials (5 types in roof) showed the standard combination of reflective foil under roof sheets and thick batts against the ceiling were the most effective.

Sustainability features
Underlining indicates added features. Note that most of these are readily achievable in an average home.

Passive design. North-facing axis; no west windows; west shade trees; north eaves and windows; louvre windows for cross ventilation; holland blinds; door seals; roof and wall insulation; white roof.

Water. Efficient showerhead, front-loading washing machine, tap aerators, dual flush toilet, ‘Econoflow’ tap mixers; 1000 L rainwater tank with first flush diverter.

Garden water. Zoned native plants; no lawn; mulch; drippers, tap timers; stormwater harvesting; greywater reuse.

Energy. Efficient fridge and washing machine; compact fluoro lights; solar hot water; evaporative air conditioner; ceiling fans; gas heater and stove.

Performance details
Details of the house and its performance outcomes are available at www.alec.com.au or obtain a Cool Living House information booklet from the Arid Lands Environment Centre.

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WHAT A COOL HOUSE!

This home uses half the energy and water of an average home in Central Australia.

How?
By installing the hardware and methods discussed in this book, annual energy and water bills were $1258 less than average homes.

---

Energy and water bills for 2003

<table>
<thead>
<tr>
<th></th>
<th>Cool Living House*</th>
<th>Average house in Alice Springs</th>
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</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>$532</td>
<td>$1220</td>
</tr>
<tr>
<td>Bottled gas</td>
<td>$190</td>
<td>$540</td>
</tr>
<tr>
<td>Water</td>
<td>$354</td>
<td>$574</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$1076</td>
<td>$2334</td>
</tr>
</tbody>
</table>

* Uses bottled gas for cooking and space heating.
FOR FURTHER INFORMATION

House design

Your Home – design for lifestyle and the future
Your Home Technical Manual is packed full of information for non-experts and professionals wanting details on sustainable housing and practical design/retrofit solutions. See www.yourhome.gov.au

Royal Australian Institute of Architects
Provides information targeted at building and planning design professionals. See www.architecture.com.au

Sustainable House – living for our future
This inspiring book shows how a Sydney terrace house was converted to a showcase of energy and water self-sufficiency. Available from libraries. www.choice.com.au or phone 02 9577 3333

Sustainability magazines

Renew – technology for a sustainable future
A quarterly magazine, for the general public, packed with articles and information on renewable energy, water conservation and sustainable housing. Available at libraries, newsagents or www.ata.org.au

Choice magazine
A monthly magazine, by the Australian Consumers Association, that independently tests the performance of home appliances and other products, including energy and water efficiency. See www.choice.com.au or phone 02 9577 3333

Energy and Water

Energy and water audits
Home audits are available in Alice Springs from Desert Knowledge Australia COOLmob (see ‘Sustainable housing assistance’ for contact details).

NT Waterwise manual
A school resource kit packed with information on central Australia’s water supplies, usage and water-saving techniques. Available from the Department of Natural Resources, Environment, The Arts and Sport. Phone 08 8951 9209

Power and Water Corporation
Power and Water can provide additional information on energy and water supplies in central Australia. Two booklets are also available on conserving energy and water use: the Green Guide and How to Create a Water Wise Garden in Central Australia.
1800 245 092

Websites
There are many websites on home energy and water efficiency such as www.savewater.com.au.

Greenhouse gases

NT Greenhouse Unit
Detailed information on NT greenhouse gas emissions and programs can be found at the NT Greenhouse Unit website. See www.nt.gov.au/greenhouse

Australian Greenhouse Office
For information on national greenhouse gas emissions and programs see www.greenhouse.gov.au

Sustainable housing

Arid Lands Environment Centre (ALEC)
ALEC offers community-based programs, workshops and information on sustainable housing, energy efficiency, water efficiency and waste recycling. Phone 08 8952 2497 or see www.alec.org.au

Desert Knowledge Australia COOLmob
Any household in Alice Springs can join the COOLmob for free and receive help to reduce home energy and water use. Phone 08 8952 0299 or see www.dkacoolmob.org

Centre for Sustainable Arid Towns (CSAT)
CSAT was formerly a research and consulting service to arid Australia with detailed information available on water, energy, building and gardens. For updates on this information, see www.alec.org.au

Water efficient plants

Greening Australia NT
Greening Australia holds regular workshops and native plant sales. Phone 08 8953 2882

Australian Plant Society – Alice Springs
APS holds regular meetings, field trips and provides information on locally-adapted plants. Phone 08 8952 2154

Olive Pink Botanic Garden
The Botanic Garden has extensive plant displays and provides information on local native plants. Phone 08 8952 2154

Alice Springs Desert Park
The Desert Park possesses a vast display of local native plants and has guided tours. Phone 8951 8788
Endnotes

Why sustainable housing


3. National Performance Reports for water utilities for 2006-07. http://www.laws.vic.gov.au. Lower Murray Water (supplying another eight town—Mildura) reported domestic consumption figures that were 4% higher than Alice Springs in this report. However, in 2006 water restrictions on public gardens reduced peak month and annual per capita consumption by 33% in Mildura. Communications, Lower Murray Water, 12/05/07.


Energy and water sources


3. See 3 ‘Why sustainable housing’.


6. Average 0.64 kg CO2e/kWh. 1.47 kg CO2e/kWh (Australian Greenhouse Office, 2004), 0.64 kg CO2e/kWh (Australian Greenhouse Office 2006). 1.47 kg CO2e/kWh (Australian Greenhouse Office, 2004).


8. Victoria, NSW and the ACT have mandatory HERS and a home must achieve 4 or 5 stars before it can be built. State-based HERS are: Basix (NSW) www.nswbasix.com.au; FirstRate (Vic) www.firstrate.vic.gov.au; Nethers (ACT) www.nethers.com.

9. www.aliceenv.org.au

Passive design for comfortable homes


2. For example, http://www.csiro.au/magnetic/CSIRO/Sustainability/Plate11/Plate11.htm

3. See 1 ‘Why sustainable housing’.

4. Alice Springs’ electricity produces 0.64kg CO2/kWh in Alice Springs’ Domestic Sector Annual Energy Consumption’ 1999. Power and Water Corporation). Bottled gas: 4 x 45kg bottles for heating & 2 x bottles for cooking per year x $95/bottle (Kleenheat Gas consumption estimate 3/9/03). Water: 700 kL/yr x $0.7246/kL. Based on 6,000 kWh/yr, required for water services to provide 10,500 ML/a of water with 14% losses. www.alicesolarcity.com.au/documents/2007/1/2006/06/29/NT_Co2_Energy_water_Billings.pdf


6. The Cool Living House used $30 of power when it had a timed booster in May-July 2003. See www.alec.org.au

7. The house was a design entry in the 2004 NT Greenhouse Friendly Housing Competition. The house has 120 m2 of air conditioned floor area, a large room of 45m2 and three bedroom.

Lighting and appliances


2. 3. Data from ‘Your Home’ manual. www.yourhome.gov.au

3. From http://www.davey.com.au/rainbank/alsoemployed.html. While care has been taken to ensure that information is true and correct at the time of publication, changes in circumstances after the time of publication may impact on the accuracy of this information. The Northern Territory Government gives no warranty or assurance, and makes no representation as to the accuracy of any information or advice contained, or that it is suitable for your intended use.

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Sally Mumford

Layout design

Elephant Stamp Design

Printer

Government Printer of the Northern Territory

Re-published September 2008 by the Northern Territory Department of Natural Resources, Environment, The Arts and Sport

Vegetable ink on 100% recycled paper

ISBN 1 920772 97 9

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