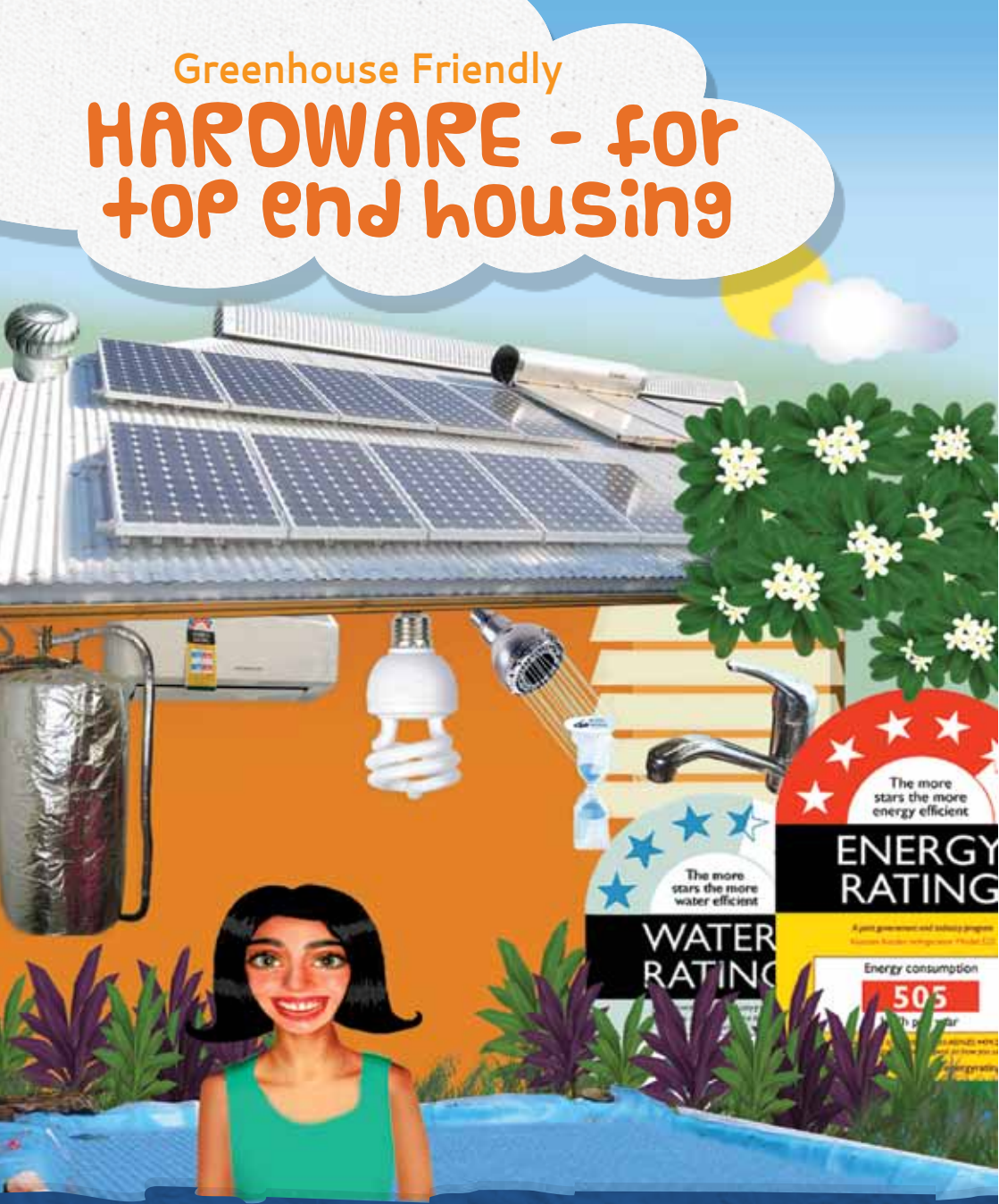
Greenhouse Friendly

HARDWARE - for top end housing



COOL mob

Destroying the myths

MYTH 1 – it takes more energy to turn on a fluorescent light than you save by turning it off when not needed.

FALSE!!! Turn off lights whenever you leave the room. Modern lights take very little energy to start up so it is better to turn them off even for very short periods of time. eg It takes less than 5 seconds of operation to turn on a large fluorescent.

MYTH 2 – low voltage tungsten halogen down lights use less power.

FALSE!!! A 50watt lamp uses the same amount of energy regardless of whether it's low voltage or a normal 240V lamp. In fact, a low voltage lamp has a transformer, usually located in the ceiling, which uses an additional 12watts consumption.

MYTH 3 – turning computing equipment on and off regularly shortens its life.

FALSE!!! The life of computing equipment is much more affected by the length of time it is left on than the frequency with which it is turned on and off.

MYTH 4 – fridges don't use much of your household energy.

FALSE!!! Fridges use a lot of power. Store only what you really need to keep cold in them and reduce your number of fridges. Turn fridges off when not needed or when going away.

MYTH 5 – ceiling fans keep a room cool.

FALSE!!! Ceiling fans only provide cooling through the moving air evaporating moisture off bare skin, so don't leave them on when not in the room.

MYTH 6 – ceiling fans use an insignificant amount of energy.

FALSE!!! Energy use by fans really adds up. A household with 6 fans left on 24/7 all year will cost you about $750 on your powerbill.

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Introduction

Individual households create almost one fifth of Australia's greenhouse pollution.

There are 7 million households in Australia, each producing, on average, 15 tonnes of greenhouse gas emissions every year.

The burning of gas to generate our electricity, instead of coal, results in less greenhouse gas emissions per kilowatt hour than the Australian average. However, due to a range of factors, the Northern Territory emits more greenhouse gases per person than any other Australian state or territory so we should all do what we can to reduce our emissions.

Typically approximately half of the emissions from Darwin and Palmerston households are from car use, approximately half are from electricity use and a small amount results from the decay of waste in landfill.

Simple changes to our everyday activities can save up to 3 tonnes of greenhouse gas each year – and save hundreds of dollars.

This is a catalogue of hardware changes that can be made to homes in the Top End to reduce greenhouse gas emissions from electricity use. It does not examine the very important area of savings that results from people changing their behaviour patterns or living in appropriately designed buildings. These issues are presented in our Greenhouse Friendly Habits in the Top End and Greenhouse Friendly Tropical Design booklets.

Reducing our impact on the environment need not reduce our quality of life. For example, maybe your pool pump need not be on for as long as it is each day, or could be replaced by an energy efficient model. Or, you would still sleep comfortably if you used a time switch to switch off your air conditioner after you have fallen asleep during the wet season. Purchasing a refrigerator with a higher star rating may save you money over time run and reduce your greenhouse gas emissions.

By being aware of the impact of the decisions we make, we can focus on those areas where we are willing to make changes.

Typical household electricity use and greenhouse profiles

The biggest electricity consumers in Top End housing are air conditioners, hot water heaters, refrigeration, large TV screens, fans and pool pumps.

Refer to Section 13. Making a change – what it means for you? for typical electricity use and greenhouse profiles.

Our COOLmob project

COOLmob is a project of the Environment Centre NT and is sponsored by the NT Government and the Power and Water Corporation. We also received other small grants from time to time. **COOLmob** is a community driven project and was established by volunteers from our community dedicating many hours of their time to help households reduce their environmental impact and energy bills.

Top End Cool Households are offered:

- a start-up kit full of money- and environment-saving ideas
- a $10 home sustainability assessment to highlight savings opportunities
- a **COOLmob** email newsletter
- discounts and incentives for greenhouse gas saving products and services

For more information, log onto www.coolmob.org, or contact the COOLmob Program Manager at the Environment Centre NT on 8981 2532, or email coolmob@ecnt.org.

Central Australian residents can call Desert Knowledge Australia COOLmob on 8952 0299, email dka.coolmob@coolmob.org or log onto dka.coolmob.org

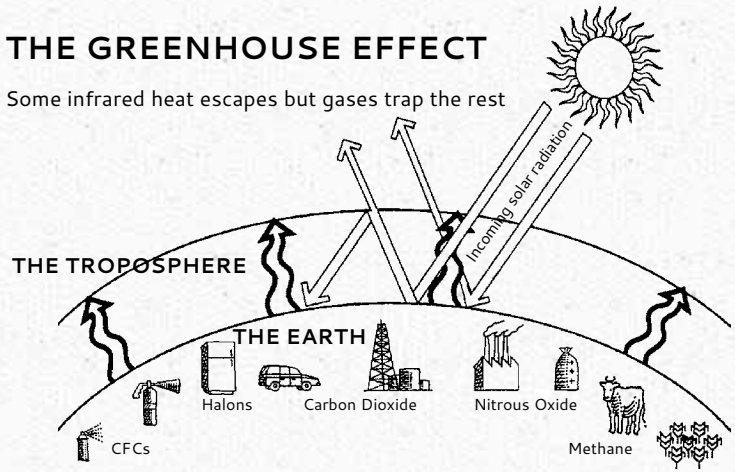
What is global warming

The burning of fossil fuels, farming and decay of rubbish in land-fill tips, generates carbon dioxide and methane. The amount of these gases is increasing in the Earth's atmosphere and they are trapping more and more heat from the sun, just like in a garden greenhouse. This has led to a rate of increase in global temperatures faster than ever experienced before – known as global warming or climate change.

Rapid increases in atmospheric concentrations of carbon dioxide (CO_2) have occurred in the last 150 years because of an increase in the burning of fossil fuels such as coal, oil and gas. Land clearing has also made a significant contribution to the build up of greenhouse gases.

Some predicted impacts in the Top End[1]:

- Average annual temperature rise between 1 and 6°C by 2070 and sea level rises of 0.8 to 8cm per decade
- Significant saltwater inundation in floodplains
- One in five year rainfall event likely to become a one in two year event
- More frequent, intense cyclones with significantly higher storm surges
- Biodiversity decrease as native species fail to adapt
- More climate-related deaths from extreme weather
- Rising insurance premiums



[1] Source: Hennessy et al (2004) Climate Change in the Northern Territory, CSIRO, see www.nt.gov.au/nreta/environment/greenhouse/climate.html

1. Measuring your Power

meters

Knowing how much electricity you are using, and having the information in front of you is important if you want to reduce your energy consumption.

This meter is simple to use, simply plug it into any powerpoint and then plug your appliance into the meter and it will automatically show you the power that appliance is using. By inputting the cost per kWh and the amount of greenhouse gases generated per kWh the operating cost and greenhouse gas emissions for the appliance are automatically calculated.

Approximate cost is $35 –$70

Meters can remotely monitor the power being used by your household. A transmitter in the meter box relays the information to a dislay unit inside your house. Current tarrif rates can be input, with readings available for kWh, costs, and greenhouse gas emissions. An alarm can be set to indicate when preset levels of consumption are exceeded.

The meter also retains historical data enabling you to access daily consumption data for comparison.

Approximate cost is $100.

There are also energy meters which work with PV solar power systems. Meters track and display both the energy produced and the energy used in the household. A colourful display indicates the total amount of electricity being used at a given time.

Some meters combine with compatible software, giving the opportunity to track the energy used.

Approximate cost: $200.

2. timer switches

Control appliances to restrict operating times and energy usage. Especially useful in households to control usage of air conditioners, electric hot water heaters and pool pumps.

air conditioners –

Set timer switch or built-in programming to:

- Turn off air conditioners after you go to sleep and, if necessary, turn on again in the early hours of the morning. Your fan will keep you cool as your body temperature drops when you sleep. Large energy and greenhouse gas savings are possible.

electric hot water heaters –

- Heating the hot water cylinder for half an hour a day usually provides sufficient hot water. Large energy and greenhouse gas savings possible. An insulated tank keeps water warm all day.
- Switch on and off manually at a house's switchboard.
- Timer switches are easy to programme so you can experiment with minimum 'on' periods.
- A timer switch wired into the circuit can be programmed so that the heating element only runs for a short period each day (preferably just prior to main period of hot water use).
- When you go away on holidays turn off your hot water switch. Any automatic time switching can easily be over-ridden.

solar hot water heaters –

- Many households find their solar hot water heater provides all the hot water they need, and the electric booster always stays turned off.
- Some households turn the booster on for very limited periods.
- Check your electrical switchboard for a clearly labelled circuit breaker or switch to turn off the booster. More info in chapter 4.

pool pumps –

- Check water quality regularly at a pool shop (usually free) to determine characteristics of your pool.
- Where possible, reduce the operating times, and adjust the timer settings, to reap significant savings.
- Running times may vary depending on usage and for different seasons. In some cases, operating times of 2 hours a day have been found to be sufficient. See chapter 12 on pools and pumps.

Plug-in timer switches

Digital or analogue

- Can be digital or analogue. Digital sometimes have an in-built rechargeable battery ensuring timer maintains correct time and programming in the event of a power failure.
- Programming options may include 24 hour or 7 day settings.
- Some have adjustable settings for weekends.
- A full cycle may include up to 6 switching sequences.
- If an appliance plugs into a standard power point you can use a plug-in timer switch to control its on and/or off times.
- If the earth (bottom) pin on the plug is bigger than usual, the appliance uses more than 10 amperes and you need to use a specialised plug-in timer switch. Hot water heaters and large air conditioners (more than 2,400 watts) can fall into this category.

special conditions
Plug-in timer switches should not be used where they could get wet. Use an outdoor switch outside.

costs
From $5 for analogue and $30 for digital units, installation costs are zero.

Power points with built-in timer switches

- Either 7 day or 24 hour programming available with a manual override switch for when timer function is not required. Programming can be changed as required by householders.
- 10 or 15 ampere ratings available and therefore able to be used for the larger room air-conditioning units (ie greater than 2,400 watts).
- Models available which are suitable for outdoor use.

special conditions
These units should only be installed by an electrician.

costs
Approximately $250, installation costs are in the order of $100.

Availability:
Timer switches available from large supermarkets, hardware stores and electrical suppliers.

2. Timer switches continued

Push button time delay switches

- Automatically switches equipment or lights off after a set period.
- Can be used either to replace an existing appliance on/off switch or in addition to it. Installation of a time delay switch next to the existing on/off switch would allow the appliance to be turned off manually before the programmed time delay period is up.
- Alternatively, time delay switches are available that switch off equipment after a second push of the button.
- Various time delays possible.

special conditions
Require an electrician to install.

costs
Approximately $200, installation costs could be in the order of $100 depending on the specific circumstances.

Timer switches that can be wired into electrical circuits

- Used where an appliance is not plugged into a power point and where a push button time delay switch is not suitable.
- Work well to limit the operating times of electric hot water heater elements.
- 24 hour or 7 day programming available. Adjustable as required by householders.
- Models available with manual override switches.
- Outdoor, weatherproof models available, such as for pool pumps.

special conditions
These units should only be installed by an electrician.

costs
Approximately $200, installation costs could be in the order of $100 depending on the complexity of the work.

3. hot water heaters

Solar hot water heaters

Solar hot water heaters provide hot water with minimal or no use of electricity.

costs
Combined systems are more efficient than separate tanks and panels but in some circumstances a separate tank may be appropriate.

Depending on size and features, prices to purchase and install range from around $2500 to $5000 depending on rebate entitlements. Installation costs vary depending on building and plumbing issues.

To find out about rebates and COOLmob specials go to www.coolmob.org

Electric heat pumps

Heat pumps may be appropriate for apartment blocks but are no where as efficient as solar hot water systems in the tropics.

Heat pumps:

- are approximately three times more efficient than conventional electric water heaters
- work on the same principle as your refrigerator, but instead of pumping heat out of the fridge to keep it cool, they pump heat into water.
- use electricity to pump a refrigerant around the system, which picks up heat from the air and transfers it to the water.

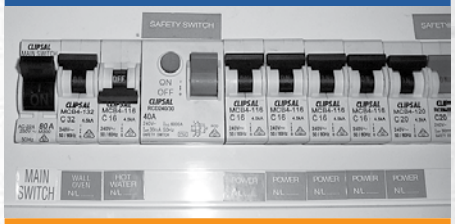
There are two main types of heat pump:

- Integrated systems, where the heat pump and hot water tank are in a single unit, or
- Split systems, where the tank and the heat pump are separated.

4. Switching off solar hot water heater boosters

Electric booster elements in solar hot water heaters do not need to be on all the time.

manual switching



Many households report they are able to get sufficient hot water for their needs from their solar hot water heaters without using electric boosters. Other households only require their boosters on for very limited periods.

Most households have a clearly labelled circuit breaker or switch on the electrical switchboard that will enable them to turn off the booster.

If you normally keep the booster switched off and run out of hot water you can either:

- Turn on the booster for a limited period (eg. half an hour) or
- Turn on the booster for the period you expect high usage, say whilst you have visitors.

"one-shot" booster switch & push button time delay switch

1. "one-shot" booster switch

- Used to turn on the booster element of a solar hot water heater for one heating cycle only when you run out of hot water and need more hot water quickly.
- The switch turns the booster off when the water becomes hot, returning the water heater to 100% solar operation until the button is pushed again. This prevents the unnecessary, relatively constant use of electricity to keep stored water above the thermostat setting.
- Push button incorporates a neon indicator to show when the booster element is operating.

costs
Approximately $170 plus installation.

2. push button on/off switch

- Automatically switches booster off after a time set by your installer (1/2 hour suggested).
- Use a switch with a neon indicator so you know when booster is on.

special conditions
Installation requires an electrician.

costs
Approximately $200 including installation depending on the complexity of the work.

5. water heating and conservation

hot water heating

extra insulation

The efficiency of electric hot water heaters is improved with additonal tank insulation and insulation of the hot water pipes.

costs
Pipe insulation costs approximately $10 per meter. Packs of bulk insulation batts start from approximately $80.

reduce thermostat setting

If the hot water temperature is above 60˚C in the kitchen or laundry savings can be achieved by reducing the thermostat setting to 60˚C. Bathroom temperatures may not be indicative of stored hot water temperatures due to safety temperature reduction devices.

- Older units may not have adjustable thermostats. An adjustable thermostat may be able to be fitted.
- Some units will have adjustable thermostats that can only be accessed by a licensed plumber or electrician. Minimum call out rate of approximately $70 can be expected.
- Modern units should have adjustable thermostats accessible to householders.

water conservation

water rating

- The Water Efficiency Labeling and Standards (WELS) Scheme provides a measurement for appliances using water.
- Check WELS Ratings at: www.waterrating.gov.au

Our daily water consumption per person in Darwin/Palmerston is nearly double that of the southern capital cities. Reducing our consumption to that achieved by other cities will save about $1M per year and reduces the greenhouse gases produced by nearly 5,000 tonnes annually.

grey water diverter

This device can be attached to a bathroom downpipe to divert water onto the garden. It can be turned back to divert water to the down pipe position at any time.

costs
Available from Hardware stores for approximately $20.

water conserving showerheads and tap washers

Saving water also saves energy and greenhouse gases. Even when using the sun to heat water, greenhouse gases result from the pumping of water to your house.

- AAA rated shower heads can reduce water consumption from over 20litres/minute to 9 litres/minute. Many can only be used with mains pressure hot water systems (not gravity feed). Plumbing suppliers can tell you the water flow rates of different shower heads. AAA showerheads cost approximately $30 each.
- AAAA toilets are now available at no extra cost.
- Flow restricting tap washers are only a couple of dollars.

other hot water saving ideas

- Always leave mixer taps in the "cold" position so that you do not inadvertently waste "hot" water.

- It is important that shower times be kept to a minimum. The use of shower timers may assist in training the young and not so young.

6. Photovoltaic (PV) solar power arrays

photovoltaic solar power systems

Solar electricity systems comprising photovoltaic panels allow you to produce your own power. They comprise solar panels installed in the sun, (usually on a roof), and an inverter to change the direct current into alternating current to feed to your power meter to be used in your home and to be fed into the power grid. Unless in a remote area, there is no need for any batteries. The system must be fitted by an accredited solar panel electrician.

The installation costs can be partly recovered by (1) the sale of Renewable Energy Credits (REC's), however their value can be included as a discount in the purchase cost and (2) rebates provided by Government. Continued savings are made as a result of your production of free power and the sale of any unused power to the Power and Water Corporation (called Feed in Tariff.)

For information go to www.coolmob.org

PV inverter

7. lighting

Hardware that will reduce greenhouse gas emissions from lighting includes low energy lamps, skylights to avoid the use of artificial lighting, and devices that reduce the time that lights are on unnecessarily, such as motion sensors.

compact fluorescent globes

Ideal to replace highly inefficient incandescent globes.

- Compact fluorescent lamps (CFLs) save up to 75% of power consumption compared to normal incandescent globes.
- CFLs have a much longer life compared to incandescent lamps. Some manufacturers claim up to 8 times longer. Always buy well known brands or they may not last as long as they are supposed to. Lightning surges may reduce life of some lamps in your household.
- CFLs cost less over time, due to their longer life and lower energy use.
- Almost every light fitting in your home can use an energy efficient CFL. They come in many different shapes, sizes, wattages and colours.

costs
Approximately $2–15 depending on wattage, style and quality.

1 and 2: Replacements for "decorative incandescent globes".

3: 11watt CFL is a direct replacement for 50W 240V tungsten halogen down lights. With an adapter kit they can be used to replace 12V low voltage tungsten halogen lamps.

costs
Globes are approximately $14 and kits are approximately $10.

Left: 20watt CFL is a direct replacement for the 75–120W PAR 38 lamp.

costs
Globes are approximately $10.

fluorescent tubes

Fluorescent tubes still remain an efficient household light source. They are available in shorter 18 watt (600mm) and longer 36 watt (1200mm). Circular tubes and fittings are also available as are energy efficient tubes (11 watt).

Light globes are available in a range of white colours from warm to cool. The colour does not affect the power consumption or the heat output.

Different lamps are available in a variety of beam angles and can spread the light beam widely or narrowly depending on your lighting needs. Consider this when replacing downlights.

Lighting comparison table and replacing halogen down lights

- Lighting costs based on 1 light with 4 hours of operation per night for 5 years with approximately equivalent light output. Costs adjusted to reflect CPI increase of 3% per annum, commencing at $0.20/kWh.

	Light fittings	Power Costs Over 5 years	Lamp Life (No. of globe replacements)	Kg of CO_2	Total operating cost
BAD					
 High energy waster and big heat generator	*Halogen 50W or 35W down light (uses up to 65W or 50W including transformer)	$101	4 @ $2 each = $8	420kg CO_2	$109
BETTER					
 (No electrician required if you have GU10 lamp fittings)	Compact Fluorescent Light (11 watt) for down light fitting	$17	1@ $14	80kg CO_2	$31
BRIGHTER					
 (Electrician required to change over)	Compact Fluorescent Light (CFL) for new standard light fitting – 11 watt	$17	1@ $2	80kg CO_2	$19
BEST					
 Cool, long lasting and efficient	Light Emitting Diodes (LED) – 6 watt	$9	1 @ $30	33kg CO_2	$39

* If replacing a halogen light that has a pin fitting it is necessary to get an electrician to remove the transformer and replace the lamp holder, and possibly the light fitting too. If the light has a GU10 lamp holder, an electrician is not required when changing the globe to a fluorescent fitting.

light emitting diodes (LEDs)

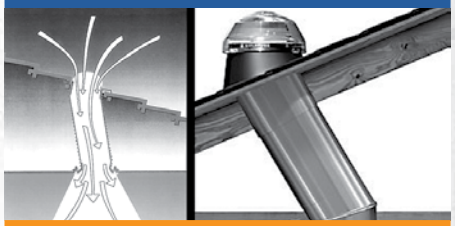
Extremely energy efficient, long lasting and create less heat. Initial cost is rapidly reducing and is quickly offset by other benefits. LED's are available in a variety of fittings, including tubes.

movement sensors

Some people leave outside lights on at night, all night, each night or when they go out. This practice can be replaced by the use of a movement sensor that only switches lights on when movement is detected.

costs
Combined lights and movement sensors can be purchased from $15.

Skylights



Skylights come in a range of shapes and sizes. If not carefully selected they can let in heat as well as light. In areas that are not air conditioned, ventilated skylights are the best option. Generally skylights consist of a clear polycarbonate roof dome that directs the sun's rays into a tube that reflects the light through a ceiling diffuser into the room space.

Natural light appears from the ceiling diffuser and looks like a powered light.

- The aluminium flashing and polycarbonate roof dome are designed to fit most roof types.
- Can be fitted with more than one tube per dome.
- Although expensive to install, natural light is good for morale. For example, the presence of natural light in workplaces has been found to increase productivity.

Skylights do not need building approval if they are installed and certified as being in accordance with the Deemed to Comply Sheet. The owner needs to keep the paperwork to prove the work is certified should they wish to sell the property.

Householders need to be aware that, in a tropical environment, leaks may occur at any roof penetration and therefore you should ensure that any roof penetration is carried out by a competent tradesperson.

costs
Approximately $600–1200 depending on style, including installation and certification.

8. appliances

If you are looking for a new air conditioner, refrigerator, freezer, washing machine, clothes dryer or dishwasher you can save money on your running costs and reduce your impact on the environment by choosing an appliance with a high star rating. The higher the star rating the better!

The energy consumption figure on the star energy rating label approximately equates to your appliances energy costs for 5 years at present power charge rates. So an energy star rating of 505kWh (kiloWatt hours per year) equates to $505 power cost over 5 years at a tariff of 20 cents per kWh).

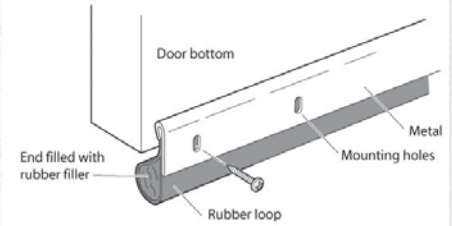
e.g. 505 kWh x 5 (years) x $0.20 = $505

Go to **www.energyrating.gov.au** to compare different appliances and models.

Use your air conditioner to remove the humidity from the air and set the temperature between 26˚to 28˚C. Combined with a ceiling fan this is very comfortable when dressed appropriately.

air conditioning

- Air conditioners use less energy when set to operate at higher temperatures. Every degree raised saves the energy used by approximately 10%.
- Air conditioner efficiency is improved if external portions of the units are well shaded and have good ventilation.
- Ensure air conditioners are correctly sized for the area to be cooled.
- Inverter split systems are 30% more energy efficient than conventional models.
- Check to see whether sleep mode is available in your conventional split system or inverter model. Once this setting is activated the air conditioner will control itself to match your sleep condition and reduce the amount of power it uses thereby lowering your bill.
- A similar effect can be achieved by using a timer.



- Ensure windows and doors are well sealed. Draught stoppers are available.

Cost
Available from hardware stores for approximately $10.

washing machines and dryers

- Washing on a cold cycle leads to significant savings on your electricity costs, if you don't have solar hot water.
- Look for the highest Energy Star rating (lowest kWh) and highest WELS rating (when choosing washing machines).
- Front loading water efficient washing machines save even more energy and greenhouse gas emissions.
- There are many light weight portable clothes lines available that can be used instead of clothes driers and they cost nothing to run.

refrigeration

refrigerator/freezer purchasing

Recent Top Energy Saver Award (TESAW) winners are some of the most efficient models available. New fridge/freezers with high Energy Star ratings use much less energy than old fridge/freezers.

- Check test results and Energy Star ratings of different models at: **www.energyrating.gov.au** The best comparisons are achieved by comparing, and selecting the lowest possible, kWh figures from tests.

re-gas old fridges

Old fridges will run more efficiently if they are fully gassed. This can be carried out by refrigeration service companies who will check for leaks and quote depending on the amount of gas required.

replace seals

If a $10 note cannot be held in place between the fridge/freezer seal and the fridge/freezer then a new seal should be installed. This can be done by the householder or a specialist. Sometimes cleaning of seals is all that is required.

Costs for replacing and installing seals for single and two door units vary between $160–$200, and $190–$250 respectively for the more common brands. It is also possible to quote the brand and model number and request a supply only price, for self installation.

cooking

microwaves and small appliances

Microwaves (from $100), pressure cookers and gas stoves (from $700) allow more greenhouse friendly cooking than electric stoves.

Use small appliances such as toasters (from $9) and benchtop appliances whenever possible. Compare how many watts (W) an appliance uses when making purchases.

Induction cooking is very efficient, quick and safe. Energy is supplied directly to the cookware which needs to be made of magnetc materials, eg stainless steel and cast iron.

costs
Approximately $170

power ratings

home entertainment

- The television, sound system and ancillary equipment are often on for at least 6–8 hours per day.
- When replacing appliances buy an energy efficient one that meets your needs, eg. an efficient LCD screen is much cheaper to run than a plasma screen. A lot of new appliances and electronic equipment have energy rating labels to help you make comparisons and helpful information is available at **www.energyrating.gov.au**.
- An entertainment system comprising TV, sound system, Pay TV receiver and games consul can easily consume 500W. Based on 6 hours per day, this equates to $250 per year and will generate approximately 1 tonne of greenhouse gases per year.
- Develop the habit of turning the television and other equipment off when no-one is watching or in the room. Startup costs are minimal.
- Consider using stereos/radios instead of televisions for background sound and company.

9. Reducing stand-by losses

Many appliances, such as computing equipment, stereos, televisions, set-top cable TV boxes, video recorders, DVD players, mobile phone chargers and microwave ovens, use small amounts of energy even when turned off at the appliance. These small amounts add up. COOLmob audits have revealed that stand-by power losses cost the average Top End household $100 a year and are responsible for the emission of 400 kilograms of carbon dioxide per year per household.

To prevent stand-by power losses, turn appliances off at the power point when not in use. The use of switched power boards can help where the power points are out of reach and power cords are in a jumble.

Switched power boards enable convenient 'switching off' of appliances.

Switched power boards

- Four and six appliance units available.
- Each appliance individually switched.
- Each switch can be easily labelled to identify appliances.

Cost:
approximately $20

Multiple appliances and equipment, or power boards can be attached to an individual switch placed in an easy to see and reach place, and plugged into appliances and equipment, or power boards. One flick of the switch turns everything on or off.

Ecoswitch

costs
$15 Available from COOLmob

Foot operated power board

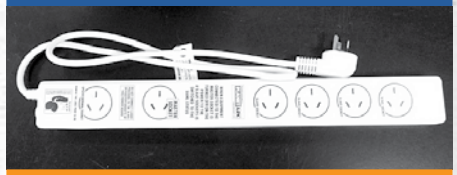
To make access to a powerboard more convenient in some situations, there is the 4 outlet foot operated power board complete with computer/internet, surge and overload protection.

When you finish with your home entertainment system or computer, simply tap the foot switch and all appliances that are connected to the powerboard will be turned off completely.

costs
$20 -$50 depending on features.

As well as the basic switched power-boards the following smart equipment makes it easier to reduce your stand-by power.

master and slave power board



This example has a total of 6 outlets. The powerboard has one master outlet, four slave outlets and one independent outlet. When the appliance connected to the master outlet is turned on (eg TV) the powerboard senses this and automatically turns on the 4 slave outlets (eg CD player etc). Likewise, when the master device is turned off, the 4 slave outlets are turned off automatically. Various models include a variety of surge and overload protection.

This is useful in controlling TV, games and sound systems, or computers, monitors and printers etc.

costs
Approximate cost $50.

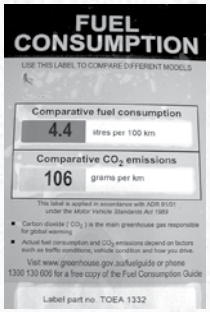
remote control switch for powerpoints

This wireless control system can be used to remotely control one to three electrical appliances via the power plug outlet. It has a range of about 50 metres and is able to control up to 4 outlets.

Available from hardware and electronic outlets.

costs
Approximately $40.

10. transport



Bicycles and legs are two of the most greenhouse friendly items of hardware you and your family can invest in.

Electric bikes are also gaining in popularity. Check out COOLmob's website: www.coolmob.org for information on models available.

There's also a lot to be said for small cars! Check www.greenvehicleguide.gov.au/ to compare the fuel consumption of different new and old models before making a final purchasing decision. It can be less costly to hire a 4WD when you need it, than running one all the time!

GreenVehicleGuide .gov.au

11. Minimising heat gain and passive cooling

By improving the natural, passive comfort of your home you will be able to reduce fan and air conditioner operating times.

Much of the discomfort in living in tropical housing is caused by heat gained through roofs. Heat gain into the house through the roof can be minimised by a combination of ventilation, shading, reflection and insulation.

roof ventilation

Allowing air to flow through the roof space is a very cost effective way of stopping heat entering your home.

This ventilation effect can be achieved using ridge vents, whirlybirds, solar ventilators and gable vents combined with eaves vents and in non air conditioned spaces ceiling vents, allowing cooler air to be drawn through the roof space.

Note that walls and ceilings between ventilated and air conditioned spaces should be designed to prevent condensation issues.

An average home will require 1 solar ventilator, 2–3 whirlybirds and 2–3 ceiling vents or 6–8 evenly spaced eave vents to adequately ventilate a roof space.

- Eave vent effectiveness is increased if vents are installed close to the wall under wide verandah roofs as the air drawn into the roof space is cooler than if vents were installed close to the outside edge of the verandah.

costs

The cost of the vents depends on type and location but a pack of 4 eave vents costs in the order of $35.

Whirlybirds cost approximately $300 depending on finish including installation and certification per unit.

Solar ventilators move 20 times more air than whirlybirds and cost approximately $1100 installed.

special conditions

Whirlybirds and solar ventilators do not need building approval if they are installed in accordance with the Deemed to Comply (DTC) Sheet and are certified by the installer as being installed in accordance with the DTC.

Paperwork needs to be retained by you to prove the work is certified should you want to sell your property.

roof painting

The use of a white reflective paint reflects a significant amount of heat away from your roof.

The roof surface needs to be cleaned prior to the application of the paint.

Some paints require spray application while others can be applied with a roller.

Normally this process will take about 3 days involving the cleaning and preparation of the roof (eg. rust removal).

costs
Depending on roof size and condition this treatment can cost in the order of $2000 to $4000.

insulation

Many types of insulation exist:

- Finely shredded recycled paper is pumped or blown into ceilings and contains borax as a fire retardant and to deter insects and rodents.
- Bulk insulation such as fiberglass or wool batts or cellulose fill (made from recycled newspaper)
- Reflective foil based products such as single layer foil and a foil backed bubble wrap type product (shiny surfaces must face air gaps greater than 25mm to be effective).

The higher the "R Value", the more heat is prevented from being transmitted. A minimum R Value of R3.5 is recommended for the tropics.

costs
Indicative cost is $25 per square metre plus installation.

notes
If bulk insulation is installed above an area which is air conditioned for a significant period each day, an air tight vapour barrier should also be installed outside the insulation layer.

Consult your supplier for advice on the correct use of vapour barriers for your situation so you do not promote mould growth.

Well shaded houses are inherently cooler than those exposed to full sunlight.

Photovoltaic solar panels fitted to your roof will shade the roof as well as producing electricity for your use or to feed into the power grid.

The three practical ways of reducing heat gain through windows and walls after a house is built are shading, painting a very light colour and window treatments. Heat gain through windows is an issue of particular importance when addressing passive comfort.

options

Shading

Awnings, including external louvres, can be fitted to restrict heat from the sun entering through window or wall areas. Awnings can be constructed from cloth or metals.

costs
Indicative supply and installation costs for external louvres as depicted in photo above, for 1800 x 1500 mm window, are $1000 for fixed louvres and $1200 for adjustable louvres. An indicative cost for a canvas awning is $720 for an 1800 x 1500 mm window.

Shade cloth can be fitted to restrict direct sunlight falling onto wall and window areas. Shaded areas outside windows also cool air prior to it entering the house.

special conditions
Special conditions may apply to ensure that installations comply with the Building Code of Australia. Reputable shade cloth suppliers will be able to advise of the current requirements.

window and door treatments

- Solar control glass can reduce heat entry up to 70%.
- The lower the Shading Co-efficient, the more heat is reflected but Daylight Transmission less than 40% may make room too dark. Note that tints in glass and films can heat up and radiate heat if not well shaded.
- Films range in quality. Ask for samples to test and if you can view past installations.
- Costs for films including installation average $85 per square metre.

improving ventilation

Good ventilation through living spaces helps cooling by both removing heat and providing cooling through evaporation. Air flow across bare skin provides a cooling sensation to people.

options

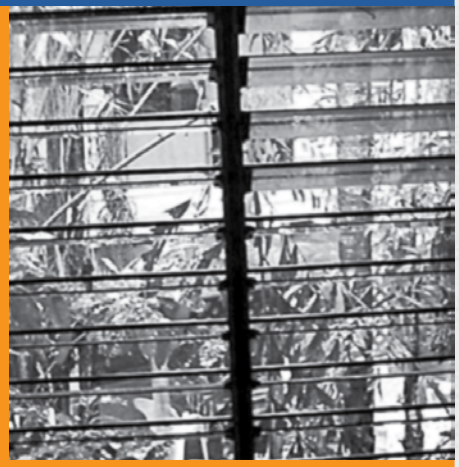
installation of louvres

Installation of louvres to either replace fixed window panels or in walls (both internal and external) will increase airflow through a space.

- Louvres provide the maximum openable area and therefore airflow. Considering that glass is a great source of heat gain it is vital that, for a given glazed area, we maximise the openable area.
- Louvre blades can be manufactured from various materials (glass, wood or metal). Wood and metal louvres prevent direct sunlight from entering the house. Check how well they seal for air conditioned areas.
- Uninsulated metal is not recommended for regularly air conditioned spaces.
- Security bars allow more air flow than security screens.

special conditions
Certification should be provided verifying that window changes meet Building Code of Australia requirements (both windows as supplied and installations).

casement windows
Side hung casement windows are the best windows for catching the breeze. They catch breezes that might otherwise go past and direct the airflow into the house.



Glass louvres with security bars

retractable flyscreens
Retractable flyscreens, that only need to be drawn when insects are a problem, allow for maximum ventilation at other times.

fans

Ceiling, pedestal and floor fans offer low cost cooling for people, not rooms. Please don't leave them running when rooms are not in use.

Whole of house fans release the hot stale air and draw in cool air. Daily running costs are about 60c per day for 8 hours. Available from Cardiffair.

12. Swimming Pools, Spas and Pumps

Pool and Spa Covers

Pool and spa covers can help to save money by:

- Reducing evaporation thereby saving on water costs (up to 97%)
- Enabling filtering times to be reduced because the amount of dust and debris entering the pool is reduced, and
- Enabling the use of less chemicals or reducing the chlorinating times because the chemical treatment requirements are reduced.

Pool covers vary depending on whether you want the cover to heat or cool the water, or just keep debris out of the water.

costs
Depending on size and type of cover required, spa covers are approximately $150 and pool covers from $350 upwards. Optional rollers to store covers are approximately $350.

Leaf debris covers for above ground pools, start at $150 and prices increase with size.

Pumps

The Viron pump, which makes use of technology developed in the NT, can save up to 70% in energy consumption and is quieter than conventional pumps. The Viron pump works at variable speeds and can also reduce the chlorinator size and wear and tear on filtration parts.

Pumps are available from selected pool shops.

costs
Approximately $1000 installed. Although a higher purchase price than a conventional pump, power savings costs would recover this additional expense in the first year or two of operation, and save CO_2 emissions and dollars.

The savings on running costs can be calculated using the Viron Pump Cost Saving guide. A link is available at www.coolmob.org

13. Making a change - what it means for you?

There are many hardware changes that can be made to top end homes to reduce greenhouse gas emissions.

We hope that the provision of this information will help you reduce your emissions and bills.

The greatest strengths of this project are the sharing of knowledge, the support we provide each other as community members and the understanding that we are not alone in our concerns – and that, yes, we can make a difference!

To find out more about the COOLmob Project:

Log on to www.coolmob.org, call 8981 2532 or email coolmob@ecnt.org

Comparing household and greenhouse profiles

The following pie charts are real life profiles of greenhouse gas emissions from electricity use in six Darwin and Palmerston households. They are copied from a random sample of household greenhouse audits completed as part of the COOLmob Project.

The profiles show the variety of usage patterns and total emissions from Top End housing. In general, the profiles highlight the significant environmental impact of air conditioners, hot water heating, refrigeration, appliances, fans and pool pumps.

End use categories are generally self-explanatory except for Appliances and Stand-By Power.

"Appliances" includes energy use by televisions, videos, stereos, computing equipment, washing machines and clothes driers whilst being actively used.

"Stand-By Power" refers to the power being used (wasted) by appliances when they are not being actively used. Measurements have shown that many appliances use power even when switched off at the appliance, if not switched off at the power point. Stand-by power is measured at electricity meters during household greenhouse audits.

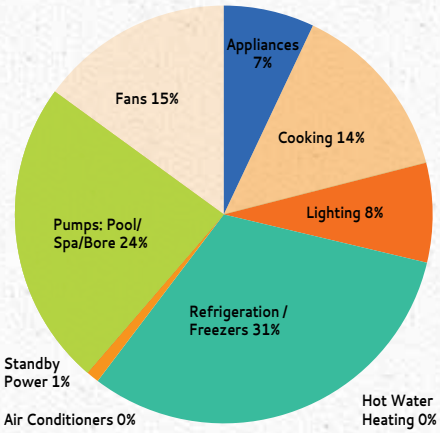
The greenhouse gas emissions calculations use the 0.79kg CO2/KWh conversion factor which was the National Greenhouse Gas Inventory conversion factor for the NT at the beginning of the COOLmob Project. This figure varies annually depending on the sources used for power generation in the NT, be they gas, diesel or renewable energy."

Many factors can contribute towards high electricity bills. Sometimes it may be an inefficient air conditioner in a room that is not being closed off, or the plasma television, or the three older model computers and fans running 24/7.

A COOLmob audit could be the first step towards identifying what is contributing to our costs and can be arranged by calling the COOLmob office on 08 8981 2532.

Since assessing these profiled households, many households have progressively made changes to lower their energy costs, and reduce their carbon footprint. Every step counts!

Energy Champion Household – $512 (less $347 generated by solar power) = $165 per year



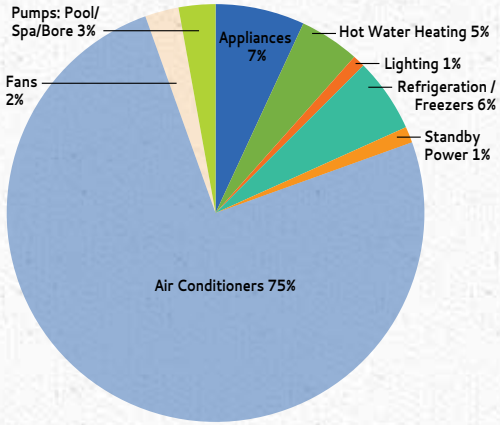
2795 kilowatt hours (kWh)/year;

2228kg CO_2/year;

3 people in household;

- 1.5kW solar power system;
- Solar water heater (booster off);
- 2 refrigerators (2nd in flatette);
- Minimum fan usage;
- Pool pump replaced with Viron energy efficient pump will bring 60% extra savings;
- Pool cover used when pool not in use, with filter set at 10 minutes.

Old Air Conditioner Household – $9958.00 per year



54,500 kWh/year

43,020 kg Co_2/year

4 people in household

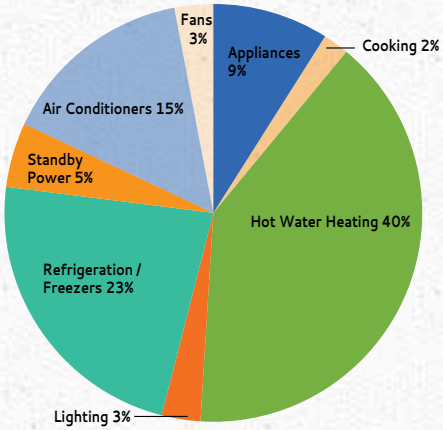
Old box air conditioners costing lots to run.

Options to reduce consumption include:

- Replace units with split systems;
- Select inverter models which use 30% less electricity;
- Run air-conditioners at 26-28˚C with a room fan and dress appropriately;
- Keep doors and windows closed, seal all draughts and install draught stoppers on doors;
- Install insulated curtains;
- Keep filters clean;
- Activate sleep mode if available, or use with a timer to lessen hours of usage while sleeping.

All household profiles shown here, include a fixed daily connection charge of $131.80 per year.

Hot Water / Multiple Refrigeration Household – $1840 per year



9997 kWh/year

7898kg Co_2/year

3 people in household

Ways to reduce greenhouse gases and energy costs include:

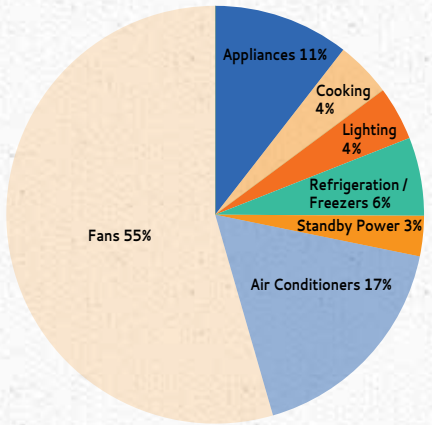
Hot water:

- Check hot water is set to 60˚C
- Turn the hot water off when you go away
- Install solar hot water and only turn the booster on when needed.

Refrigeration:

- Refrigeration uses a lot of power
- Have an appropriate size and number for your needs
- Turn off when not needed.

Fans Running 24/7 Every Day Household – $1690 per year



9230 kWh/year

7290kg Co_2/year

3 people in household

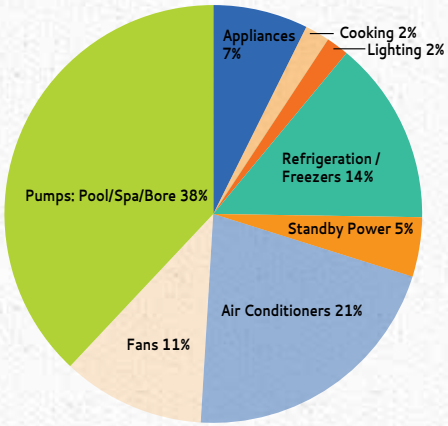
Each fan running all day, every day adds over $120 to the electricity bill.

Reductions could be made by:

- Only using the fans when someone is in the room;
- Fans do not reduce the room temperature they only cool people;
- Open the windows where possible to encourage the flow of cool air through natural ventilation;
- Shade external walls and windows

Implementing these measures could lead to savings over $600 per year.

Swimming Pool Household – $2642 per year



14,430 kWh/year;

11,400kg Co_2/year;

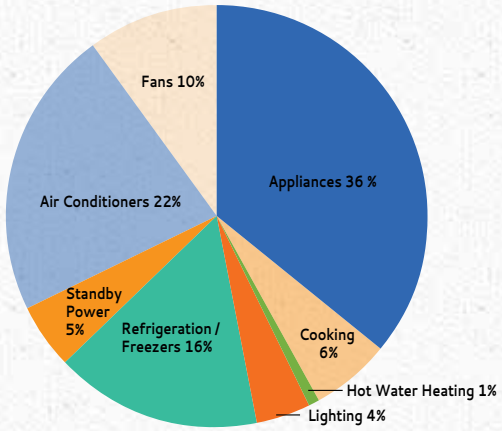
2 people in household;

The pool pump is costing over $700 a year to run.

Options to reduce include:

- Have the pool or spa water accessed regularly;
- Keep the pool clean and chemicals balanced – try reducing your pool pump running times to decrease costs;
- Use a pool cover to reduce dust, debris and evaporation (saves 97% water loss);
- Install an energy efficient pool pump (savings of $550 per year possible for this household);
- Visit the pool pump calculator on www.coolmob.org to see how much you could save on your pool pump.

Flatscreen TV Household – $3176 per year



17,345 kWh/year

13,703kg Co_2/year

4 people in household

High entertainment costs – Large plasma television screen using 550watts running for 12 hours daily, together with amplifiers for surround sound, and multiple game machines;

Long hours adding significant costs to the household electricity bill.

Savings could be made by:

- Only turn televisions on when someone is watching;
- Upgrade to a light-emitting diode (LED) screen and consider how big a screen is needed;
- Use stereos/radios instead of televisions for background sound and company
- Turn off appliances when not in use.

Comparing Household Energy Use

Pumps: Pool/ Spa/Bore	Standby Power	Fans	Air Conditioners	Cooking	Appliances	Lighting	Refrigeration /Freezers	Hot Water Heating
Energy Champion Household – $512 (less $347 generated by solar power) = $165 per year								
24%	1%	15%	0%	14%	7%	8%	31%	0%
Old Air Conditioner Household – $9958.00 per year								
3%	1%	2%	75%	gas	7%	1%	6%	5%
Hot Water / Multiple Refrigeration Household – $1840 per year								
–	5%	3%	15%	2%	9%	3%	23%	40%
Fans Running 24/7 Every Day Household – $1690 per year								
–	3%	55%	17%	4%	11%	4%	6%	0%
Swimming Pool Household – $2642 per year								
38%	5%	11%	21%	2%	7%	2%	14%	0%
Flatscreen TV Household – $3176 per year								
–	5%	10%	22%	6%	36%	4%	16%	1%

Save money and fight climate change

Environment Centre NT
protecting nature | living sustainably | creating a climate for change

Northern Territory Government

PowerWater

COOLmob

www.coolmob.org

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Printed on recycled paper.