

# A Guide to Simple Energy Saving Ideas for Your Home





# Contents

Blocking draughts	4
Insulation	6
Heating and cooling	8
Windows	10
Hot water	12
Solar Power	14
Battery Storage	16
LED lights	18
My action plan	19

# Blocking Draughts

## What is the most cost effective retrofit?

Blocking up draughts is particularly important in older homes, and can often be the single most effective way to keep warm in winter and cool during summer. When energy experts calculate 'pay back periods' on energy efficiency measures – blocking up draughts will often come out in front. This is because households typically spend half of all their energy bills on heating and cooling, and blocking up draughts mostly involves inexpensive materials and measures, which in many instances can be done yourself.

## Where do draughts occur and what can I do about them?

There are draughts throughout our homes, leaking in cold air in winter and hot air in summer. These can drastically drive up our energy bills with heating and cooling. Draughts can occur through every opening in walls, floors and ceilings, including electrical switches and power points, plumbing, wall vents and gaps between floor boards as well as around doors and windows. See the table for a few common draughts and how to fix them.

## How can you tell if there are draughts?

Draughts can be spotted in a number of different ways. Sometimes it's as simple as seeing daylight under doors or around window frames, but sometimes you have to be on the lookout for them as they can be harder to detect. Here's a few easy ways to detect draughts;

- + Seeing curtains or blinds move when it's windy outside.
- + Holding tissue up around fireplaces or over floor boards and see if the tissue moves.
- + Watching the way smoke from an incense stick moves.
- + Hearing windows rattle in the frames during storms.
- + Simply feeling air moving against your hand or on wet skin.

## Can blocking draughts be unhealthy? What if we don't have enough air to breathe?

If your home has been built in the last 5 years then draughts are not likely to be an issue. This is because building regulations have improved and many new homes are reasonably well sealed. Older homes can be very leaky though. It is important to make sure there's enough fresh air inside. However the typical home has 3 to 8 times more fresh air (air changes per hour) than we need for health and oxygen supply.

Generally speaking, a lack of ventilation in a home is usually noticed by damp or even mouldy conditions forming – if this happens in your place then we'd recommend not blocking up draughts and seek advice on natural ventilation or damp issues.

When in doubt, ask for a professional opinion through a Home Energy Assessment.



Draught source	What can I do?
Gaps around plumbing in kitchen and bathroom Gaps around split air conditioner hoses	Acrylic or silicon sealant or caulking Foam fillers Minor carpentry
Bathroom extraction fan	'Draught Stoppa' exhaust fan hat
Gaps around window and door frames	Weather strips and seals Acrylic or silicon caulking
Wall vents	Piece of contact or simple plastic cover Cover with magnets or other way to remove and affix
Gaps between floor boards	Timber filler Under-floor insulation Carpet with underlay Rugs or mats
Unused fire places	Get chimney professionally blocked Bag stuffed with newspaper (remember to remove if lighting fire in winter)
Around window architraves and skirting boards	Acrylic sealer or caulking
Wall / window mounted air conditioners (not split systems)	Make a canvas or wooden cover to place over the box on the outside when air conditioner is not in use

# Insulation

Ceiling insulation could cut your heating and cooling bills by 45%!

## Why get insulation?

Insulation will help improve the comfort of your home and cut the cost of your energy bills. Ceiling insulation alone could cut your heating and cooling bills by 45%! In summer you can keep cool air inside longer and in winter it is easier to keep the heat in, keeping your home at a pleasant temperature.

## How does it work?

Insulation works by slowing down the transfer of heat from inside to outside and vice-versa. It does this either by trapping air using bulk insulation, or by reflecting heat using foil insulation. By slowing down the transfer of heat you don't have to use heaters or air conditioners as much, and when you do, you can use them for a shorter time and with greater effect. It's just like a blanket for your house!

## What to insulate?

- + Ceilings and roofs
- + Walls
- + Floors
- + Water pipes

## I have ceiling insulation, do I need wall insulation too?

Yes! Just like putting a jacket and hat on will keep you warmer than just putting a hat on. Having insulation in your walls will keep the house warmer in winter and cooler in summer. We also recommend having a look at your ceiling insulation to see if it needs topping up. Insulation can often settle and need topping up or can be disturbed or removed if damaged by people conducting work in the roof, such as electrical work. Insulation installed several years ago is also likely to be thinner than what is currently recommended. Extra insulation can be like a second blanket on a cold night.





## How does blow-in wall insulation work for a brick veneer home?

If you wish to insulate an existing wall then blowing the insulation in is a great option. This is usually done by removing the tiles at the bottom of the roof space to blow it in from the top. Then to get the insulation in under the nogginns of your house frame (the horizontal supporting beams) a hole can be created from the outside to blow it in. The hole is about the size of a 50c coin and will be made where bricks join. The hole will then be filled with matching mortar and will not be noticeable unless you are really looking!

## How does this work for a weatherboard home?

Blow in insulation can be done in the same way for weather board homes, however most people choose to remove weather boards and put batts in. One reason for this is that it provides an opportunity to ensure that there is no hidden rot on the boards and you can replace them if there is.

## How long does installation of blow in insulation take?

Blow in insulation can usually be installed within a day or two on an average sized suburban home.

## What about under floor insulation?

If you have gaps around floor and ceiling joins, draughty floorboards or a generally cold floor then under floor insulation might be worth considering. If you can get under the house this can be fairly simple but if you have no access under the house then it is a harder task and may require you to pull up some of the floor from the inside. Another option to consider is putting floor coverings down to insulate the floor from inside. This can be as simple as an area rug on a tile floor to keep it warmer in winter and then removing it in summer to take advantage of the cooler floor.

**For more information visit:**  
<http://www.yourhome.gov.au/passive-design/insulation>

# Heating and cooling

## What is the most energy efficient type of heating and cooling system?

Heating and cooling can be responsible for around half of the typical household's energy bills, so it's important to make the best choices possible. Some heaters and air conditioners can last 20 years so carefully consider all your options, and make the best choice for your home.

## Is gas heating still the most efficient?

You've probably heard that gas heating is energy efficient but this is changing. The cost of gas continues to rise each year, which means that the running costs for powering a split system reverse-cycle air conditioner is now cheaper than powering a gas heater.

In addition, some houses with solar photovoltaic (PV) panels can generate enough electricity to cover one or more electric reverse cycle air conditioners (ACs) and have found that this is a cost effective and 'climate-friendly' way of heating and cooling their home. The same can be said for households that purchase 100% Green Power.

However, if your home doesn't have solar PV panels and you are buying 'normal' (coal) electricity, we would strongly recommend purchasing 100% Green Power if you want to run an electric heater rather than a gas heater.

## Which heaters and air conditioners are best to buy?

If you need a new reverse cycle AC or

heater, then definitely select one with the highest energy efficiency star rating. There's a full list of star ratings of appliances available online at [www.energyrating.gov.au](http://www.energyrating.gov.au).

If you already have an electric reverse cycle unit that works then we would suggest not replacing it but simply ensuring that your solar PV system generates enough power to run it, or buying 100% Green Power to cover all your electricity, including your heating and cooling needs.

## I like to heat my bedrooms as well as my living rooms, so isn't hydronic central heating the best?

Not necessarily. Although hydronic central heating can be efficient to run and produce a lovely heat, they can be expensive to purchase and install. Expect quotes from upwards of \$1,000 per panel installed for even a basic system.

For some households, you may be better off choosing two or more highly efficient reverse cycle ACs in the bedrooms and living areas, rather than going for hydronic central heating. This is partly due to the ease of controlling split ACs, setting different temperatures in different rooms, but also it may be more attractive in terms of purchase cost, running costs and greenhouse emissions. The difference in cost may even be enough to purchase a solar PV array and generate your own clean energy for heating and cooling. Of course the other benefit is that ACs will cool your home as well as heat your home.

If you really need central heating, then it's good to avoid gas ducted central heating as they typically suffer from heat losses



in ducting and delivery of the heat, even if the central gas furnace has a good star rating. See this interesting information from Beyond Zero Emissions about energy losses from gas ducted central heating (<http://bit.ly/1P7PdL>).

## I'd like to get hydronic central heating - what should I look for?

As hydronic systems run on hot water, it is important to ensure that the hot water system is energy efficient too. Heat pump hot water systems can be a great choice for running a hydronic heating system (see Hot water section on page 16 for more info), but be careful of running a hydronic heater on an older gas or electric storage hot water system, this can be very energy intensive. Be cautious of claims that the hydronic heating can be "solar-powered" because solar hot water systems typically don't perform well during winter, and this is the time when you want to run the heater!

An evacuated tube will help boost a hydronic system but the roof space and financial investment may be better used for



heating household hot water or solar PV panels.

If you do choose a hydronic central heating system, make sure that all pipes, joinery and junctions are properly insulated, and avoid locating the radiant panels on uninsulated exterior walls as the heat will go straight through the walls! Insulate your walls properly first, or consider installing the panels on internal walls instead.

## What about insulation, windows and draughts?

The energy efficiency of the building has a huge influence on how much energy it takes to maintain a comfortable internal temperature all year round. In fact, a super insulated, 10 Star rated (Nationwide House Energy Rating Scheme NatHERS) home will not need any heating or cooling systems.

# Windows

Windows can prove to be quite tricky when balancing the need for natural light, access to fresh air and aesthetics while maintaining a thermally comfortable home. Windows are a weak thermal component of the building shell and can account for up to 40% loss of a home's heating energy in winter and up to 87% of heat gained from outside through windows. A single glazed window will have an R-value\* of around 0.17, so windows by themselves are only a minor barrier to heat transferring.

## Is it worth replacing existing windows with double glazed ones?

Double glazing is great for comfort and energy efficiency, but it can be expensive. If it is out of your budget then you can consider prioritising windows - for example replacing the south facing windows or your main living areas first.

## Does double glazing work in summer too?

Heat transfers through windows by radiation or conduction. Double glazing works in both summer and winter to reduce the temperature conducted from outside but is less effective at reducing radiated heat from direct sunlight. Therefore to keep your home cooler in summer it is a lot more effective to shade the windows from the

outside, keeping the sun off the glass.

This can be done through shade cloths, awnings or exterior shading, which can come in the form of blinds or even trees and bushes (deciduous plants work really well, as they will shed their leaves and let the light in during winter).

In winter the way to keep warm is to trap a still layer of air – like double glazing or curtains - read on for more tips.

## How effective are curtains?

Curtains are a great option and work nearly as well as double glazing for keeping heat in. They can keep the warm in and the cold out. Both double glazing and curtains work in winter by trapping a still layer of air – just like insulation. Provided you can trap a layer of air against the window, then curtains or close fitting heavy blinds are a good alternative to double glazing, for a smaller cost. This also makes them a good option for renters. Some curtains or blinds can also trap air within the fabric using a distinctive honeycomb design.

For curtains on a rail a pelmet makes them even more effective, by eliminating air flow between the curtain the window (see diagram on page 9).

## What about temporary window films?

Window films can work really well for some windows. However they don't work well on aluminium framed windows, because so much of the temperature transfer

actually comes from the frame. If you have aluminium windows we recommend using window films on supplementary frames.

Follow this link to a video about how to install window films and get a great result: <http://youtu.be/QM4Uj1JqPic>

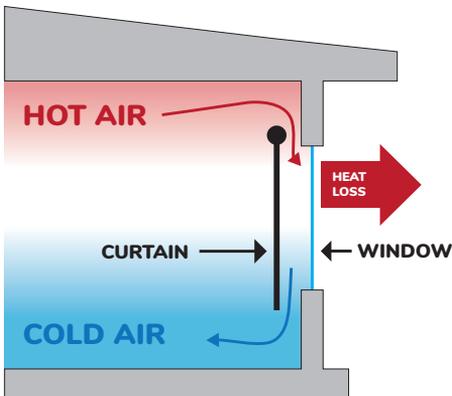
## Can I attach a movable supplementary frame?

For each window opening, you can fabricate a supplementary timber frame (similar to empty picture frames) that can be attached to the inside of your existing window. This is a way to still allow light in during the day. You can then attach the tape and membrane to these additional frames and you will achieve a still layer of air between your window film-faced

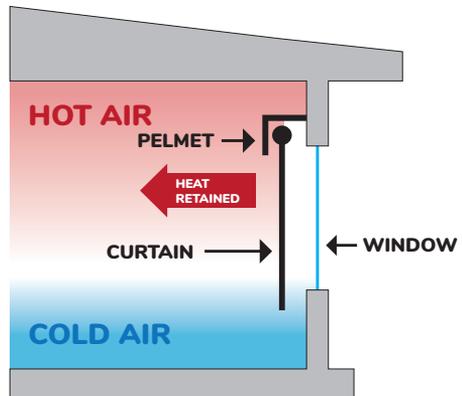
'picture frames' and the existing window. Frames made of timber will help provide the insulation lacking in aluminium windows, and will provide the same insulation benefit as a standard double-glazed timber or composite-framed window.

This can be a great solution on operable windows that you like to open in summer time, you can stack the frames against each other when you want to open up the windows and enjoy a cool summer breeze.

If your window is timber framed, attaching bubble wrap to the glass can be a great way to insulate a window and offers a cheap and easy solution for renters.



Without pelmet



With pelmet

# Hot Water

## What is the most energy efficient type of hot water service?

If you need a new hot water system or if you are looking to replace one then it's important to be as energy efficient as possible. Hot water systems can often be responsible for 16% of household energy usage and they can last for around 10 years, so choose carefully. There are a few things to consider before choosing a system, like:

- + What time of the day do you use hot water the most?
- + How much hot water do you need?
- + What do you use hot water for?
- + How much roof space do you have?
- + What type of electricity supply do you have? Green Power? 'Normal' coal power? Or maybe your own solar roof top array?

## Is solar hot water the best?

You've probably heard that gas boosted solar hot water can be very energy efficient, and it's true. However, many households are now choosing to move away from using natural gas as it is still a fossil fuel and the cost of gas continues to rise each year.

Some houses with solar panels can generate enough electricity to cover an electric heat pump for hot water and have found that this is most cost effective and 'climate-friendly' way of heating hot water. The same can be said for households that purchase 100% Green Power.

It's also important to remember that solar hot water collectors take up roof space,

which might be better used for solar panels, which can supply all electrical household appliances as well as an electric hot water system.

However if your place doesn't have solar panels and you are buying 'normal' (coal) electricity, we would strongly recommend purchasing 100% Green Power if you want to run an electric hot water system in an environmentally friendly way.

## Boosting solar hot water with gas or electricity?

It's important to remember that sometimes solar hot water systems need to be boosted by either gas or electricity to provide enough hot water through the colder months. It's best to boost hot water systems with clean renewable energy either through purchasing 100% Green Power or through having your own solar array on the roof. Gas can be an efficient option, however many households are now moving away from using gas as it's still a fossil fuel.

## What's a heat pump?

Traditional electric water heaters use electricity to heat water directly through an element, whereas, a heat pump uses electricity to operate a pump that circulates a refrigerant around the system. The pump uses far less electricity than the element.

A refrigerant then picks up ambient heat from the air and transfers it to the water. It's the same principle as a reverse cycle air conditioner; it just heats water instead of air. In this way heat pumps are able to use far less electricity than traditional electric hot water systems. That means they cost less to run and create less greenhouse gas emissions.

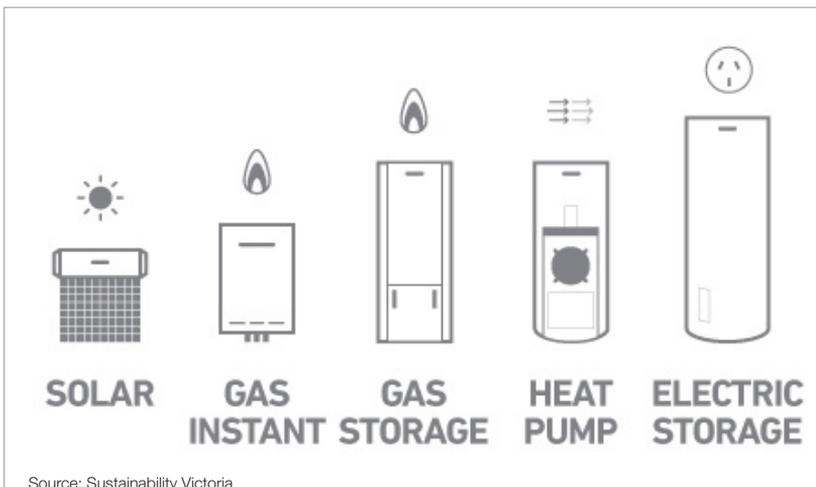
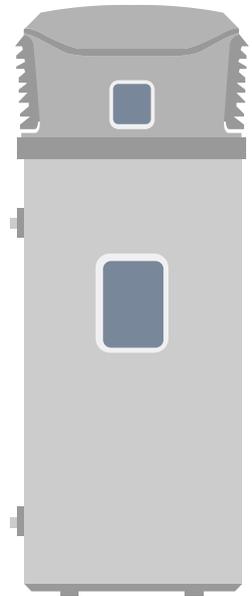
## Aren't heat pumps noisy?

The way that a heat pump works is the same as an air-conditioner running 'reverse-cycle', and can generate heat. The main difference is that a heat pump heats water rather than air. You have probably come across air-conditioners and have heard the 'fan-coil' unit whirring away on a hot day. Heat pump systems are similar and care should be taken when choosing where to locate a heat pump away from bedrooms or places where the noise might disturb others. It's important to note that the new types of heat pumps are getting quieter so ask a heat pump supplier what your options are.

## Which should I choose; solar hot water or a heat pump?

If you are looking for a new hot water system or have one that needs replacing then we recommend a heat pump system for a number of reasons:

- + Many households are moving away from using natural gas as it is a fossil fuel with associated greenhouse gas emissions
- + The cost of gas continues to rise each year
- + Solar hot water systems use up roof space exclusively for hot water. Instead this space could be used to install solar panels which can provide power to other appliances as well as hot water



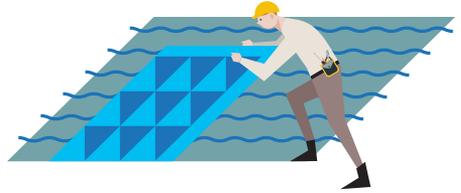
Source: Sustainability Victoria

<http://www.sustainability.vic.gov.au/services-and-advice/households/energy-efficiency/at-home/hot-water-systems>

# Solar Power

## Installing Solar

Solar panels on your roof convert energy in the form of sunlight into direct current (DC) electricity. The DC power is then transformed by the inverter into 240V alternating power (AC) that is then used in the house. Any surplus energy that is not used by the house is then exported back to the grid. For each kilowatt hour (kWh) of electricity that goes back into the grid the household receives a feed-in-tariff (FIT), which is a price (in cents per kWh) credited to your bill. You will need a smart meter installed if you do not already have one.



The best financial benefits of solar are achieved when most of the electricity generated is consumed at the site, as you then avoid paying your retailer your current electricity rate per kWh. Following the installation of a solar system, less electricity will need to be purchased from your electricity retailer, therefore decreasing your electricity bills.

## What size do I need?

Finding the system that best suits your needs will depend on:

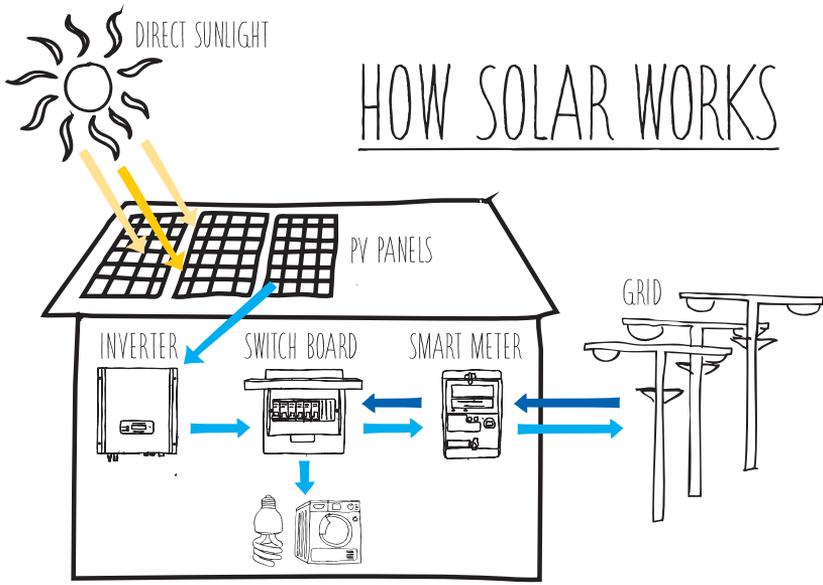
- + How much electricity you use (daily usage)
- + Your roof size, its orientation and shade
- + How many people live in your home and when they are home
- + Your budget

The table below provides estimates to help you consider what size system will work for you. If you are considering batteries or intending to install batteries in the future then you would look to increase the system size to ensure sufficient power generation for winter months. Speak to an installer regarding your needs.

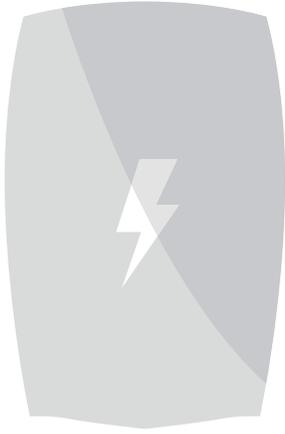
## Rough Guide

System size	Solar couple	Solar for 4	Serious solar
	5kW	7kW	10kW
Recommended for	Couples and retirees	Average family with two kids	Big family
Daily solar power produced*	18kWh	25.2kWh	36kWh

\* Average solar power generated each day, based on 3.6 solar hours. (You can compare this to your daily usage as a quick way of estimating how much of the electricity you use could be covered by solar power).



# Battery Storage



## A popular question recently has been “what about batteries?”.

The media has given a lot of attention to the recent advances in battery storage technology.

Here’s a basic explanation of what these batteries mean for your average Australian home.

## Why is it revolutionary?

Battery storage to complement a solar PV system has existed for some time but typically involved lead-acid batteries. These batteries need monthly maintenance, are very large and heavy, emit hydrogen gas (so have to be stored carefully) and have to be replaced approximately every 5 years. There are now a range of new battery solutions available for residential homes. Lithium ion batteries are currently the popular option. The new lithium ion batteries are lighter, low maintenance, don’t emit hydrogen gas and are guaranteed for up to ten years with a life expectancy of

around 10-15 years.

The advantage of having battery storage is that you can store the power when it is generated (when the sun is shining) and use it when your panels are not generating electricity (i.e. after dark or on cloudy days).

## Great, so that means I should get them?

Lithium-ion battery storage is an emerging technology and is still very costly to buy.

For most homes an in-home battery storage system is not cost-effective. When adding the panels, the inverter, the batteries and all the components for a 5kW system (which would probably be sufficient for a fairly energy conscious family home that remains connected to the grid but wants the benefit of being able to store solar power that is not used during the day), the large price tag would mean a return on investment of around 11-14 years. Given that the warranty on lithium ion batteries is usually ten years this does not make battery storage financially attractive.

However, the fact that the technology is now readily available should mean that more companies will develop similar systems, creating a competitive and more affordable market. Sign up to the eNews to stay informed.

## I already have solar PV and an inverter, so can’t I just add batteries?

Most existing inverters are now what is called ‘battery ready’. However, you may find that if your inverter is over ten years old it needs replacing or that other electrical work will need updating. We recommend

talking to the installer of your system to see if they can give you an idea of what is involved and potential costs.

## But I've already got the panels, so that must save me some money?

True. And in most cases when you do add on battery storage you will not need to replace your panels. However your panels themselves are not really the bulk of the cost of a system. Your inverter and the labour involved in installing it (electricians are highly skilled and risk their lives, so they charge accordingly) are.

## What do you mean 'in most cases you won't need to replace panels'?

For those of you who were early adopters let us first say well done! Hopefully you have been receiving a favourable feed in tariff and reaping the benefits. Although your panels should still be working fine the rules and regulations have changed, so you may find that some of your wiring and panels no longer meet requirements.

Please also note that if you do make any adjustments to your existing system you will may lose your current feed in tariff.

## Can I go off grid?

An entirely 'off-grid' system that generates and uses only power from their own solar panels is a particular set up. Depending on your circumstances it may be worth investing in solar and batteries, rather than connecting to the grid. However, if

you are already connected to the grid we recommend staying that way.

Staying grid connected ensures that you always have access to power - even when your solar is not generating power and your battery is drained. So if there are extended periods of dull weather you won't have to worry.

Staying grid connected also means that on really sunny days when your solar is generating more power than you need and the battery is already charged you can send the access power back into the grid for someone else to use.

## So I should hold off getting solar until I can get the full package?

It is entirely up to you. We firmly believe that it is worth getting solar as soon as you can. You will start saving on your bill and adding more renewable energy into the power supply. Your system should pay for itself in savings within 3-6 years. So if you are going to be looking at adding a battery back-up system in 5 or more years then it is still worth getting solar now. Then when the time is right you can simply add batter storage to your system.

# LEDs

Replacing halogen downlights with LEDs could save you up to 89% on your lighting bills.



Some government rebates are available for some lighting replacements if replaced by a qualified electrician. These can reduce the cost of LED significantly and in some instances can be free. The installer will usually complete the paperwork on your behalf.

For more about available rebates and support for replacing lighting visit:

<http://www.yourhome.gov.au/energy/lighting>

## What are LEDs?

LED stands for Light Emitting Diode. LEDs consist of a collection of small solid light bulbs that are extremely energy efficient.

They convert 60% of their electricity into light, compared to only 5-10% for CFLs. LED bulbs also last about 25 times as long as incandescent globes, and up to 10 times as long as CFLs – it simply makes sense to switch and save!

## What types of LEDs are available?

There is a whole range available for different lighting applications and different lighting fittings. Most types of lights are now available in LED.

## Why get a professional to change my lights?

Old style halogen downlights have a transformer in your ceiling cavity. If you get those lights replaced by a qualified electrician then they will remove the transformer completely and install the new LED lights for you. Having the transformer removed means that you can then top up your ceiling insulation to fill any gaps.

A qualified electrician will provide you with a certificate of compliance, a warranty and (if you go through reputable company) they will claim any rebates on your behalf.

Installing LEDs through a government program means that installers can quote you a set price per light, which covers the labour for the install, as well as the light itself. There may be a minimum number of lights required to get this price or you will have to pay a call out fee.

## So why not do it myself?

If you want to simply buy LED light globes from a shop and replace them yourself this is fine. There are now many styles of globes to fit all kinds of fittings, including halogen downlights and can be put in without removing the transformer.

# My Action Plan

Here's a quick checklist to help you prioritise energy efficiency actions in your home.

**Today's date:**

## *My Energy saving actions:*

Done	To Do	
<input type="checkbox"/>	<input type="checkbox"/>	Check ceiling insulation for topping up
<input type="checkbox"/>	<input type="checkbox"/>	Insulate inside wall cavities
<input type="checkbox"/>	<input type="checkbox"/>	Draught proof my home
<input type="checkbox"/>	<input type="checkbox"/>	Purchase energy efficient appliances
<input type="checkbox"/>	<input type="checkbox"/>	Replace halogen downlights with LEDs
<input type="checkbox"/>	<input type="checkbox"/>	Install curtains
<input type="checkbox"/>	<input type="checkbox"/>	Install external shading
<input type="checkbox"/>	<input type="checkbox"/>	Double glaze windows
<input type="checkbox"/>	<input type="checkbox"/>	Install a heat pump hot water system
<input type="checkbox"/>	<input type="checkbox"/>	Install solar panels
<input type="checkbox"/>	<input type="checkbox"/>	Install reverse cycle AC for heating and cooling
<input type="checkbox"/>	<input type="checkbox"/>	Turn off appliances at the power point
<input type="checkbox"/>	<input type="checkbox"/>	Wash clothes in cold water

