

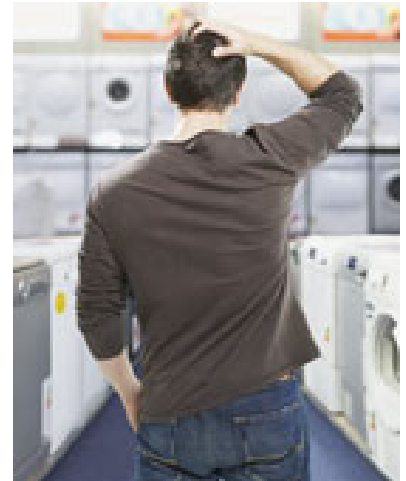
# Buying Guide – Energy Efficient Heating and Appliances

## Introduction

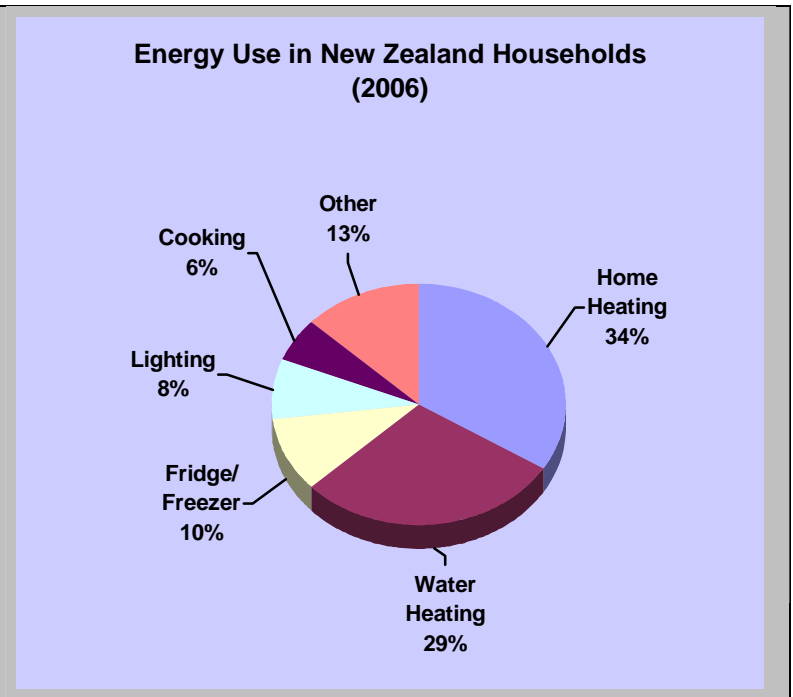
Buying energy efficient heating systems and appliances can be difficult and confusing at times. Use this guide to simplify the process and provide the information you need to select the most energy efficient and practical heating and appliance options for your home.

To begin, you must understand where household energy is most commonly used.

A typical household of four uses approximately 12 000 kilowatt hours of energy per year (Approx \$2400 pa @ 20c per kWh). This energy is consumed in the following ways:



Household Energy Use	% of Total	Annual Energy Costs
Home Heating	34%	\$820
Water Heating	29%	\$700
Refrigeration	10%	\$240
Lighting	8%	\$190
Cooking	6%	\$140
Other Appliances	13%	\$310
<b>Total</b>	<b>100%</b>	<b>\$2400</b>



**ENERGY EFFICIENCY TIP:** 80% of household energy is used for *home and water heating, refrigeration and lighting* so pay particular attention to these areas.

## How can we determine the most energy efficient products?

All appliances have two major components of cost: the initial purchase price and ongoing running costs. To figure out the most efficient option for your budget, you have to look at both these costs. To work out the operating costs look for the energy rating label and energystar logo now available on most household appliances (see below)

### Energy Rating Labels



Energy Rating labels are a good way of comparing the energy use of appliances. They use a 'star' based system to identify the energy efficiency of products. Each additional star is approximately 10 percent savings on running costs over standard models.

The label also displays the kilowatt usage per year which you can use to estimate the annual running costs. For example an appliance that uses 500kWh a year will cost you about \$100 a year to run (based on energy costs of 20c per kilowatt hour).

Energy ratings apply to:

- Fridges,
- Freezers,
- Washing machines,
- Clothes dryers,
- Dishwashers and
- Air conditioners

### Energy Star

ENERGY STAR® is only awarded to the most energy efficient appliances and electronic products. If you see the Energy Star mark, you can be sure it is one of the most energy efficient models available and is significantly more energy efficient than the average comparable model.

In New Zealand, you'll find the ENERGY STAR mark on leading;

- Heat pumps
- Dishwashers
- Washing machines
- TV's
- DVD players & recorders
- Home theatre systems
- Computers & monitors and
- Office equipment and
- It's coming soon to Fridges and Freezers.



## Home Heating – 34% of home energy costs!

Choose the right heater for the space you want to heat and don't forget to make sure your home is well insulated and curtains drawn at night – or the heat you are paying for will be wasted!

### What size heater do you need?

A useful guide to calculating the size you need is:

- Allow about 44 watts per cubic metre of room volume.
- Add another 10 percent for a large window area and another 10 percent for building code minimum insulation or 20 percent if there is no insulation.
- If it's a lounge, living area or office multiply by 1.5. If it's a bedroom or hallway, make it 1.2, and for other areas multiply by 0.8.

**Example:** A well-insulated bedroom 3m x 4m x 2.4m high has a volume of 28.8 cubic metres. Multiply by 44 to get 1267 watts, and again by 1.2 to get 1520 watts (1.5kW).

### Heating Options

Use the information in this section to help you make the best home heating choices.

#### (A)Heat Pumps

Reverse cycle air conditioners (otherwise known as heat pumps) are the most efficient form of heating available on the market. They will not only keep you warm in winter but also cool in summer.

They work by taking heat (or cool air) from outside your house and transferring it inside. Some heat pumps can produce up to 5 kilowatts (kW) of heating for every 1 kW of electricity they use - energy efficiency at its best! (A conventional electric heater will only deliver 1 kW of heating for every 1 kW of electricity used).

Generally the heat output of a heat pump is quoted at 7° Celsius (sometimes referred to as H1). If you live in a place that regularly drops below 2 degrees outside in winter ask your heat pump supplier to size it for your room based on the units H2 performance (this is measured at 2° Celsius).

The following table lists one common sizing method used by suppliers:

	Area sizing method
Non-insulated house	150W per square metre
Well insulated house	120W per square metre

**Example:** If you need a heat pump for a 50m<sup>2</sup> living area in a well insulated house, heating output of your heat pump can be calculated as 120 x 50 = 6000 Watts (6kW).

## **(B)Wood Pellet Burners**

Wood pellet burners are gaining popularity due to their cleaner burning properties and convenience over solid wood burners. Running a pellet burner costs around 8c to 14c per kWh. This is more than a woodburner (using bought firewood) or a heat-pump - but less than half the cost of running a conventional electric heater. They're also competitive with flued reticulated gas heaters and central heating - depending on regional prices.

Wood pellet burners look similar to conventional wood burners in the sense that they are available as freestanding or fire place insert models. However wood pellet burners offer you the ability to have a lot more control over how much heat is produced by using an electrical thermostat. They can also be used with some central heating systems.

The wood pellets are made from 100% wood residues (usually sawdust and wood shavings) that are dried and compressed into small cylinders using steam.

## **(C)Gas Heaters**

Gas home heating can include reticulated natural gas where your house is connected to gas mains and LPG heaters that use bottled gas. When choosing a gas heater, ask about condensing gas heaters, which are more efficient than normal gas heaters and will help reduce your energy bills.

### **Flued Gas Heaters**

There are a range of flued natural gas or LPG heaters available including modern flame effect fires as well as more traditional models. As a rule, having a flame effect makes a fire less efficient than a similar model without a flame effect.

Gas fires can be fitted into existing fireplaces or be freestanding, and in many cases no hearth is required for the freestanding models. Heater flues can run down and out, horizontal and vertical. This means that gas heaters do not need to be on an outside wall and can be installed almost anywhere in the home.

### **Unflued Gas Heaters**

Unflued gas heaters, including portable LPG heaters, have no vent or chimney to carry away emissions. Emissions include water vapour, nitrogen dioxide and carbon monoxide. These are all released directly into the room, all of which can harm your health if there is no fresh air ventilation. It is always better to use flued gas heaters with a vent to the outside rather than unflued gas heaters.

## **(D)Electric Heaters**

Electric heaters are not very efficient to run but are relatively cheap, portable and convenient. They are most useful if you want to provide quick warmth for a single person or a single room. For well-insulated homes that don't require a lot of heating, panel heaters and oil-filled column heaters are good options.

Radiant fan heaters are also popular in areas such as the bathroom (take care to keep the heater well away from water). Because of the risk of fire and burns, radiant heaters shouldn't be used in bedrooms or around young children.

**HOME HEATING TIP:** For heating large living spaces we recommend using a highly efficient heat pump. It may cost more upfront but will cost far less to run than most other heating systems. Payback period around 5-7 years.

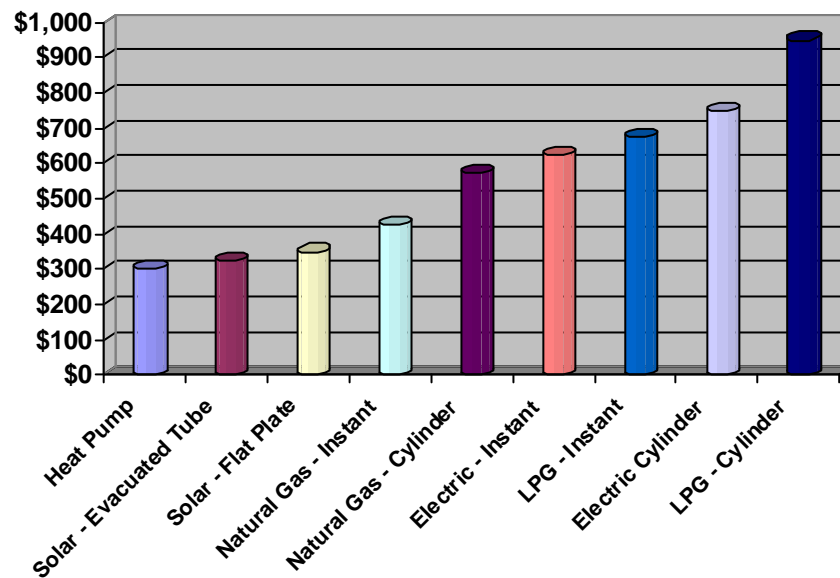
## Water Heating – 29% of home energy costs!

About a third of your annual household electricity bill goes on water heating. There are two main types of water heating — storage systems and instant flow systems. Both are suitable for most households. There are also options for how to heat the water — with electricity, natural gas, LPG, solar power, a heat pump or a solid fuel like wood.

### Water Heating Costs

When looking at what a hot water system might cost you, you need to consider ongoing costs as well as the initial investment. As a guide, installing a gas or electric system costs about \$2500; a heat pump costs about \$5000 and a solar water heating unit around \$7000 (not including any government subsidies). Now look at the ongoing running costs:

#### Hot water system annual running costs



Approximate running costs for a typical family of four. (Data source: [www.energywise.govt.nz](http://www.energywise.govt.nz) February 2008)

#### Easy tips for energy efficient hot water use...

- Use a low flow showerhead
- Reduce water flow from your taps
- Check and fix any leaking or dripping taps or pipes
- If your hot water cylinder is warm to touch use a cylinder wrap (modern 'A' rated cylinders will not require a wrap)
- Wrap at least the first metre of hot water pipe from your cylinder
- Use cold water for washing clothes, rinsing dishes, filling the jug etc
- Turn off the water heater when you go on holiday
- Have showers instead of baths and keep your showers relatively short (5-7 minutes)
- Choose water-efficient household appliances
- Don't run the hot tap unless you need hot water

## How much hot water do I need?

A useful guide for calculating hot water use is about 60 litres a day per person. This means a standard 180 litre cylinder will be more than sufficient for most households of 2-4 people, especially if using the easy tips above. Remember, it is highly unlikely you will all require hot water at the same time so be conservative as a larger cylinder will cost you extra to heat every minute of every day!. Of course, for instant electric or gas hot water systems a storage cylinder will not apply.

## Water Heating Options

Use the information in this section to help you make the best home heating choices.

### (A) Electric hot water cylinders

These are the most common form of water heaters in New Zealand. Although the cheapest option to purchase they are not very efficient to operate compared to other options. If buying a new electric cylinder, consider buying a 'solar-ready' tank, which can have a solar panel, or heat pump, connected to it easily in the future.

### (B) Gas hot water cylinders

There are several gas water storage heating options that can use natural gas (mains gas) or bottled LPG. Gas hot water cylinders can be situated inside or outside the house. Condensing systems are the most efficient type but have to be located outside. You can't put a cylinder wrap on a gas hot water system. These systems reheat the water more quickly than an electric system does.

### (C) Heat pump water heating

Heat pump water heaters use electricity to move heat rather than generate it. The sun heats the air around your home each day, and a heat pump water heater on the outside of your house shifts some of this heat into your hot water cylinder. Heat pump water heaters can supply on average \$3 of hot water for every \$1 of electricity they use, making them one of the most efficient options.



## **(D) Solar water heating**

Solar water heating systems are very efficient and can be effective anywhere in New Zealand, providing up to 75% of your annual hot water needs. A solar water heater works by absorbing energy from the sun in collector panels on your roof. This energy is then transferred to water stored in a hot water cylinder. When the sun can't heat enough water to meet your needs, the heat supply can be boosted by electricity, gas or a wet-back system.

You'll need an unshaded section of roof approximately 3-5 square metres, ideally facing within 20 degrees of true North. Panels should be tilted towards the sun. The optimum angle depends on your latitude: in Auckland, for example, panels should be about 37% from horizontal and in Dunedin about 46%. If you tilt the panels up more than these figures, you will gain more heat during winter and less during summer. Tilting the panels down will give more summer heating and less in winter. If your roof doesn't slope correctly, your installer can supply a secure frame to give the right tilt. You may also be eligible for government funding of \$1000 to install one of their specified solar water heating systems in your home. Visit [www.energywise.govt.nz/solar](http://www.energywise.govt.nz/solar) for more details.

## **(E) Wetback systems**

You can supplement your hot water system with a wetback fitted to a wood or pellet fire, range or burner system. A wetback is a pipe arrangement that fits in the back of the firebox and uses heat from the fire to heat water. The type and location of the hot water cylinder can often determine if you can fit or use a wetback, so check with the firebox manufacturer and a plumber.

## **(F) Instantaneous hot water systems**

Instant flow gas heaters, heat water as it runs through, so don't need a storage tank. You won't run out of stored hot water but do have to choose a system with a flow rate that will provide enough flow of hot water for your needs.

**WATER HEATING TIP:** For very efficient water heating systems consider a heat pump system or solar water heating system. It will cost more upfront but will cost far less to run than other water heating systems. Payback period usually 5-7 years.

## **Household Lighting – 8% of home energy costs!**

For a complete review of lighting see our article titled 'Switched on lighting advice' and refer to the running costs for lighting below.

**LIGHTING TIP:** use compact fluorescent lights (CFL's) wherever possible as they can save up to 80% on energy costs over standard incandescent lights. There are also options for using CFL's to replace halogen downlights commonly used in new homes. Payback period less than one year.

## Household Appliances

Appliances account for about 30 percent of your household's energy consumption and is typically consumed as follows:

- Refrigeration (10%),
- Cooking range (6%),
- Dehumidifier (4%), if applicable
- Spa (3%), if applicable
- Dishwasher (<2%),
- Computer/games (<2%),
- Clothes dryer (<2%),
- Electric jug (1%),
- TV (1%)
- Washing machine (<1%)



**ENERGY EFFICIENT TIP:** In the average household over 50% of appliance energy use (excluding heating and lighting) is for *refrigeration* and *cooking* so pay particular attention to running costs when purchasing and using these items. Note also the high energy use of dehumidifiers and spa's.

### How Much Electricity Do Appliances Use?

This chart shows how much energy a typical appliance uses per year and its corresponding cost based on national averages. For example, a refrigerator uses almost five times the electricity the average television uses.

Appliance Running Costs			
	Typical wattage	Cost (cents)	per
<b>Bathroom</b>			
Bathroom heater - fan	2400	48	hour
Bathroom heater - infrared	1100	22	hour
Heated towel rail	80	39	day
Shower		82	10 minutes
Small bath		96	bath
Large bath		156	bath
<b>Heating</b>			
	Typical wattage	Cost (cents)	per
Cupboard heater	180	87	day
Fan heater - 2 kW	2000	40	hour
Fan heater - 2.4 kW	2400	48	hour
Heat pump - 4.4 kW heating output	2000	40	hour
Heated towel rail	80	40	day
Heater - one-bar	1200	23	hour
Heater - two-bar	2400	48	hour
Oil-filled heater - small	1200	23	hour
Oil-filled heater - medium	2000	40	hour

Oil-filled heater - large	2400	48	hour
<b>Kitchen</b>	Typical wattage	Cost (cents)	per
Breadmaker	500	10	loaf
Cake mixer	350	8	hour
Carving knife	230	6	hour
Coffee machine	750	16	hour
Cooktop (per element)	1700	33	hour
Crockpot	230	37	8 hours
Dishes – handwashing using hot water		16	sink
Dishwasher - 15 years old	2000	73	load
Dishwasher - new	2000	38	load
Electric frypan	1240	26	hour
Electric jug	2400	3	boil
Extraction fan	40	1	hour
Food processor	375	8	hour
Freezer - chest 164 L		21	day
Freezer - vertical 300 L		42	day
Fridge/freezer - 10 years old - 380-450 L		60	day
Fridge/freezer - new - 380-450 L		48	day
Kitchen radio		<1	hour
Microwave	1000	20	hour
Oven	1900	88	roast
Oven (scones)	1900	36	batch
Rangehood	150	3	hour
Toaster (2-slice)	1400	1	load
Waste disposer		8	hour
<b>Laundry</b>	Typical wattage	Cost (cents)	per
Clothes dryer - 5kg load	1800	82	load
Clothes dryer - 3.5kg load	1800	59	load
Ironing	1400	28	hour
Washing machine - older front loader, cold *	165	12	load
Washing machine - older front loader, warm *	165	19	load
Washing machine - new front loader, cold *	165	3	load
Washing machine - new front loader, warm *	165	18	load
Washing machine - older top loader, cold *	165	3	load
Washing machine - older top loader, warm *	165	38	load
Washing machine - new top loader, cold *	165	2	load
Washing machine - new top loader, warm *	165	26	load
<b>Lights</b>	Typical wattage	Cost (cents)	per
40 watt bulb (incandescent or halogen)	40	5	6 hours
60 watt bulb (incandescent or halogen)	60	8	6 hours
100 watt bulb (incandescent or halogen)	100	12	6 hours

150 watt bulb (incandescent or halogen)	150	18	6 hours
Compact fluorescent - 60 watt equivalent	15	1	6 hours
Compact fluorescent - 100 watt equivalent	20	2	6 hours
Fluorescent 1.2 m	40	6	6 hours
Fluorescent 1.5 m	65	8	6 hours
<b>Other appliances</b>	Typical wattage	Cost (cents)	per
Computer and monitor	200	3	hour
Dehumidifier	300	48	10 hours
Digital alarm clock	8	3	day
DVD	20	1	hour
Electric blanket - double	200	3	hour
Electric blanket - single	150	2	hour
Fan	200	3	hour
Hair dryer	1600	32	hour
Power drill	500	10	hour
Security alarm	5	1	10 hours
Sewing machine	200	3	hour
Shaver	15	9	week
Stereo	85	1	hour
Television	81	1	hour
Vacuum cleaner	1100	24	hour
VCR	21	1	hour
Waterbed - queen size		122	day
<b>Pools</b>	Typical wattage	Cost (cents)	per
Swimming pool filter		261	day
Spa pool	6000	120	day

### Guide to the table

This table was last updated in June 2008. Costs are based on electricity charges of 20 cents per kilowatt hour.

## Refrigerators & Freezers – 10% of home energy costs!

Fridges and freezers use about 10% of an average household's electricity bill. As well as energy efficiency (see energy ratings above), it's also worth considering:

### Refrigerator/Freezer tips

- Size - choose a fridge or freezer that is the right size for your household - one large fridge is better than two small ones.
- Shape - Upright fridge-freezers with one door above the other are generally more efficient than units with side-by-side doors. Chest freezers are more efficient than upright models. With an upright freezer, cold air escapes every time you open the door.
- Upright freezers with enclosed drawers (not baskets) are a good compromise.
- Water and ice dispensers - through-the-door features such as cold water dispensers and ice-makers use more energy and cost more.
- Make sure your refrigerator door seals are airtight. Test them by closing the door over a piece of paper or dollar note so it is half in and half out of the refrigerator. If you can pull it out easily, replace the seals.
- Ensure there's adequate ventilation at the top and back of refrigeration equipment – check the manufacturer's specifications on minimum clearance.
- Set the fridge temperature between 2 - 5°C, and the freezer to -18°C. To check refrigerator temperature, place a thermometer in a glass of water in the centre of the refrigerator. Read it after 24 hours. To check the freezer temperature, place a thermometer between frozen packages. Read it after 24 hours.
- Defrost the fridge/freezer at least twice a year to keep it running efficiently. If it frosts up quickly, check the door seal.
- Avoid placing your fridge or freezer next to heat sources or in direct sunlight.
- Look for a refrigerator with automatic moisture control. Models with this feature have been engineered to prevent moisture accumulation on the cabinet exterior without the addition of a heater.
- Cover liquids and wrap foods stored in the refrigerator. Uncovered foods release moisture and make the compressor work harder.

## **Cooking Range – 6% of home energy costs!**

Cooking uses about 6% of an average household's energy bill, and a lot of that is wasted heat.

### **Cooking tips**

- The 'exposed coil' elements you find on most cooktops aren't particularly efficient. They heat the pot and the air around it, as well as the food. Solid disk elements, which are found on some cooktops, are even less efficient.
- Induction elements are the most efficient type of cooktop element on the market. They heat the pan using a strong magnetic field, while the element itself stays fairly cool. They use about half of the energy of an exposed coil element but are relatively expensive.
- Ceramic glass cooktops and halogen elements are also more efficient than exposed coil elements. They're also easier to clean as the element is under glass. Halogen lamps also provide instant heat.
- Convection or fan ovens use about 35% less energy than conventional ovens and more items can be cooked at the same time because heat is more uniformly distributed.
- Gas is also more efficient than a conventional electric cooktop and oven and provides easily controlled instant heat.
- If you need to purchase a gas oven or range, look for one with an automatic, electric ignition system. An electric ignition saves gas - typically 41 percent in the oven and 53 percent on the top burners - because a pilot light is not burning continuously.
- In gas appliances, look for blue flames; yellow flames indicate the gas is burning inefficiently and an adjustment may be needed.

## **Dishwashers – 1-2% of home energy costs**

Most of the energy used by a dishwasher is for water heating.

### **Dishwasher tips**

- Compare models using the Energy rating labels or select one with an ENERGY STAR® label.
- Size - choose a dishwasher that is the right size for your needs - if you choose a machine that's too big, you'll be tempted to run it when it's not full
- Look for a model with an eco cycle
- Heating its own water is better

- Check water efficiency ratings - an inefficient dishwasher will use about 25 litres of water per load, whereas efficient models can use about 12-15 litres, or less on eco settings; you can search for water-efficient machines at [www.energyrating.gov.au](http://www.energyrating.gov.au) or at [www.wsaa.asn.au](http://www.wsaa.asn.au) (click on 'Save Water' and on '5As Rated Products Search')
- Check the manual that came with your dishwasher for the manufacturer's recommendations on water temperature; many have internal heating elements that allow you to set the water heater to a lower temperature.
- Scrape, don't rinse, off large food pieces and bones. Soaking or prewashing is generally only recommended in cases of burned-on or dried-on food.
- Be sure your dishwasher is full, but not overloaded.
- Don't use the "rinse hold" on your machine for just a few soiled dishes. It uses 10 to 25 litres of hot water each time you use it.
- Let your dishes air dry; if you don't have an automatic air-dry switch, turn off the control knob after the final rinse and prop the door open a little so the dishes will dry faster.
- Remember that dishwashers use less water than washing dishes by hand, about 22 litres less per load; dishwashers also use hotter water than you would use if you were washing the dishes by hand, so they can do a better job of killing germs.

## Other Energy-Saving Kitchen Tips

- Be sure to place the tap lever on the kitchen sink in the cold position when using small amounts of water; placing the lever in the hot position uses energy to heat the water even though it never reaches the tap.
- Cover pots when boiling water; it's faster and it uses less energy.
- Match the size of the pan to the heating element.
- If you cook with electricity, turn the stovetop burners off several minutes before the allotted cooking time. The heating element will stay hot long enough to finish the cooking without using more electricity. The same principle applies to oven cooking.
- Use small electric pans or toaster ovens for small meals rather than your large stove or oven. A toaster oven uses a third to half as much energy as a full-sized oven.
- Use pressure cookers and microwave ovens whenever it is convenient to do so. They can save energy by significantly reducing cooking time.

## **Clothes Dryer – 1-2% of home energy costs**

Clothes dryers are inefficient users of energy, often with energy ratings of 1-2 stars only. Do you really need a clothes dryer at all? If so, use the tips below.

### **Clothes dryer tips**

- Compare models using the Energy rating labels, better still select one with an ENERGY STAR® label.
- Size - choose a clothes dryer that is the right size for your needs - if you choose a machine that's too big, you'll be wasting energy every time you use it.
- Look for a model with an auto-sensing feature or a timer. Auto-sensing prevents overdrying. This saves energy and is also better for your clothes.
- Clean the lint filter in the dryer after every load to improve air circulation.

## **Washing Machine – less than 1% of home energy costs**

About 80 to 85 percent of the energy used for washing clothes is for heating the water. There are two ways to reduce the amount of energy used for washing clothes: use less water and use cooler water.

### **Washing machine tips**

- Compare models using the Energy rating labels or select one with an ENERGY STAR® label.
- Check water efficiency ratings - an inefficient washing machine will use about 100 litres more water per load than efficient models. You can search for water-efficient machines at [www.energyrating.gov.au](http://www.energyrating.gov.au) or at [www.wsaa.asn.au](http://www.wsaa.asn.au) (click on 'Save Water' and on '5As Rated Products Search')
- Size - choose a washing machine that is the right size for your needs - if you choose a machine that's too big, you'll be running it when it's not full.
- Switching your temperature setting from hot to warm can cut a load's energy use in half. Unless you're dealing with oily stains, the warm or cold water setting on your machine will generally do a good job of cleaning your clothes.
- When shopping for a new washer, look for a front loading (horizontal-axis) machine. This machine may cost more to buy but uses about a third of the energy and less water than a top-loading machine.
- With a front loader, you'll also save more on clothes drying, because they remove more water from your clothes during the spin cycle.

## More household energy saving tips...

### Things that cost nothing and save cash

- Turn off lights when leaving a room.
- Use the sun and wind to dry your laundry.
- Close curtains and windows at sunset in the winter.
- If you have a second fridge, turn it off when not required.
- Block off open fireplaces when not in use.
- Switch off TVs, DVD players, stereos, etc at the wall when not in use. Appliances on standby waste energy – But do this only if practical.
- Run heated towel rails for a few hours only.
- Reduce your hot water cylinder temperature, but not less than 60°C.

### Simple and inexpensive - under \$60

- Fill gaps in your ceiling insulation.
- Plant a deciduous tree to shade your largest west-facing window in summer. You'll get shade in summer, sun in winter.
- Fit draught and rain stoppers on external doors.

### Measures that pay for themselves in 1-5 years

- Insulate the ceiling.
- Block draughty air gaps around plumbing pipes and electrical cables, windows and doors, with caulking and weather strips.
- Insulate remaining hot-water pipes.
- Insulate under timber floors.
- If the ground underneath your house is wet, cover with polythene, taping the joints and around piles.

### Measures that cost more but pay for themselves in 3-15 years

- Increase insulation, particularly in your ceilings
- Double-glaze your windows.
- Install awnings or shades over windows that overheat your home in summer. This will reduce the need for cooling fans and air-conditioning.

We do hope you find this information useful. Every success on your *energy efficiency* journey!



**The Horizon Homes Team**