

## Saving with hot water

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Hot water heating typically uses a third of the energy needed to run a home in New Zealand. And because the electric hot water cylinder was invented here, they are still very widely used, despite being incredibly inefficient.

Using renewable and energy efficient hot water systems is one of the easiest ways to improve your home's energy efficiency and save money off your power bill. Making use of the free energy from the sun to heat your water is a great way to future proof your home against energy price increases.

### Tips: Simple steps to saving hot water

- Fix dripping taps and save \$20–\$30 per year.
- Use cold water when filling the kettle and only heat the amount you need.
- Wash dishes by hand or in a water efficient dishwasher.
- Fill up the jug using the cold tap. If you have a mixer, make sure it is turned round to its cold setting.
- Wrap the hot water cylinder with an insulation wrapper and save 5% or \$60 per year. Lag (insulate) the pipes up to one metre from the cylinder and save \$20 per year.
- The less hot water you use, the less water will need to be heated. That's why the water saving devices such as low flow shower heads and taps will also save you on power bills. Fit water-saving shower heads and save \$50.
- Take showers instead of baths and save 5%. Reduce your shower by two minutes and save 2% of energy in most homes.

(EECA figures)

## Wrapping your own hot water cylinder (and lagging the pipes)

Hot water cylinder wraps and pipe lagging are widely available from hardware stores. First check what size hot water cylinder you have. Most electric hot water cylinders are either 135 litres (small) or 180 litres. New cylinders may be larger than this. It is worth wrapping even new hot water cylinders.

To lag pipes, you can buy foam tube pipe insulation from your local hardware store or plumbers' merchants. It's important to wrap the first metre of the hot water pipe from the cylinder as this is where most heat loss occurs.

To install a cylinder wrap, you need to have good access to the cylinder. You will need at least 5 cm all around the cylinder - more will make the installation easier. If you have easy access to the cylinder, installing a wrap is not difficult and takes about two hours.

### Tips for lagging pipes and wrapping cylinders

- Lag your hot water pipe first.
- Check for leaks and that connections are in good condition - if there is a problem, get this fixed first.
- If you need to cut your wrap down to size, mark it up first use a knife, and cut over a timber surface.
- If it's tricky to get the wrap around, you can tie a cord to a bottom corner of the wrap to help pull it round the cylinder.
- Tape the join together near to where the thermostat and element control box are, so they can be accessed in the future if you need to.

Warning: If you have a gas hot water cylinder, these should not be wrapped as they need ventilation to be safe, but you can still lag the hot water pipes.

## Case study: Hot water cylinder wraps

In terms of value for money, hot water cylinder wraps and pipe lagging remain a fantastic investment. Nine houses in Beacon's Papakowhai Renovation project, with cylinders ranging in age from 1970s to 2005, had their pipes lagged and cylinders wrapped.

This proved worthwhile in all cases, boosting efficiency between 11% and 30%. In fact, the cylinder wraps appear to be worthwhile even on modern A-grade cylinders, particularly if only low volumes of hot water are used.

## Types of hot water system

Type of system	Description
Low pressure electric cylinder	<ul style="list-style-type: none"> <li>▪ Widely installed – most older hot water cylinders (more than 10 years) are of this type.</li> <li>▪ Are often small (135 litres). If you regularly run out of hot water, this is probably what you have.</li> <li>▪ Low pressure hot water systems also often can only run one tap at a time at a good pressure of hot water. There are some low pressure cylinders which give you high pressure delivery (indirect mains pressure cylinders); however, these are less energy efficient as they are often operated at high temperatures.</li> <li>▪ Electric hot water cylinders are very energy inefficient, and older systems are poorly insulated so have a lot of heat loss.</li> <li>▪ If you are replacing your electric hot water cylinder with another one, then you can get better insulated (and larger) low pressure hot water cylinders, but even a new cylinder will benefit from a wrap.</li> <li>▪ Modern hot water cylinders last 12-20 years.</li> </ul>
High pressure electric cylinder	<ul style="list-style-type: none"> <li>▪ Most modern electric hot water cylinders are high pressure/mains pressure cylinders and most are 180 litres or bigger.</li> <li>▪ Generally mains pressure systems can cope with several hot taps being turned on at once without a drop in pressure.</li> <li>▪ These systems are more expensive than low pressure cylinders.</li> <li>▪ Sometimes, upgrading from low pressure to high pressure can put stress on your plumbing, and leaks can develop, or even pipes blow.</li> <li>▪ Like low pressure cylinders, these are energy inefficient and even new, better-insulated cylinders will benefit from a wrap.</li> <li>▪ Modern hot water cylinders last 12-20 years.</li> </ul>
Instant electric hot water	<ul style="list-style-type: none"> <li>▪ These are relatively uncommon in homes, though can be used for small systems.</li> <li>▪ They heat the hot water at the time it is required, rather than leaving it to sit around all day, so are more efficient than electric hot water cylinders.</li> <li>▪ However, they generally require heavy duty electrical wiring which is not normally used in residential situations.</li> <li>▪ Because they heat at the time you want it, the electricity will often be charged at peak rates, so they can be an expensive way to heat water.</li> <li>▪ They are best used as a supplementary system where the outlet is a long way from the main hot water system.</li> </ul>

<p>Gas hot water cylinder</p>	<ul style="list-style-type: none"> <li>▪ These systems are slightly more energy efficient than an electric hot water cylinder.</li> <li>▪ They also have high heat losses but, because they need to be ventilated, they can't have a hot water cylinder wrap installed.</li> <li>▪ They need to be located in a well-ventilated area (e.g. a basement) and so can often lead to long pipe runs – with associated heat losses. They also need to be flued to remove exhaust gases.</li> <li>▪ They have a quicker heat recovery time than a comparable electric hot water cylinder.</li> <li>▪ If you have several gas appliances, a gas cylinder will likely be cheaper to run than an electric cylinder; however, if you only use your gas for hot water, it will be more expensive – gas daily connection fees are high.</li> </ul>
<p>Instant gas hot water</p>	<ul style="list-style-type: none"> <li>▪ Water is heated when you turn on the hot tap.</li> <li>▪ Some systems have controllers which let you to choose the delivery temperature, e.g. 41°C for shower, 38°C for bath. This reduces the waste of heating water to high temperatures, and then cooling it by adding cold water.</li> <li>▪ Having no hot water cylinder means no standing losses.</li> <li>▪ Most efficient systems can have a COP of 0.95 – where 95% of the energy you put into the water is turned into heat.</li> <li>▪ If you have several gas appliances, will likely be cheaper to run than an electric cylinder; however, if you only use your gas for hot water, it will be more expensive – gas daily connection fees are high.</li> </ul>

Wetback	<ul style="list-style-type: none"> <li>▪ Wetbacks generally provide a boost to the water heating system, particularly in the winter when most required.</li> <li>▪ They can be used in conjunction with wood burners or pellet burners.</li> <li>▪ They are most useful in areas with a cold climate and a long heating season, and where the wood burner heats the house well, so there is surplus energy to heat the water.</li> <li>▪ In areas with low winter sunshine (e.g. Dunedin/Southland), wetbacks can be a good combination with solar hot water to get year-round hot water.</li> <li>▪ They are also very useful in areas with low security of energy supply and abundant wood, enabling a greater degree of self sufficiency and resilience. The wood heating component is generally regarded as carbon neutral.</li> <li>▪ If retrofitting a wetback, generally they should be within 5 metres of your hot water cylinder, or plumbing costs can be high.</li> <li>▪ Modern wetbacks are more efficient than older ones, and have fewer air emissions.</li> <li>▪ If you live in an urban area, your burner and wetback must comply with National Environmental Standards for emissions (see <a href="http://www.mfe.govt.nz">www.mfe.govt.nz</a>).</li> </ul>
Heat pump hot water	<ul style="list-style-type: none"> <li>▪ These are relatively new type of efficient electric hot water system.</li> <li>▪ An all-in-one system has the heat pump as part of the hot water cylinder. These are normally located outside so it's important that hot water pipes are lagged, and they are located near to where the hot water is needed.</li> <li>▪ Split systems have the heat pump part located outside and the hot water cylinder (which can be a modern electric cylinder) located inside the house.</li> <li>▪ The outside unit can be quite noisy – so think of your neighbours and your own night time comfort when locating them.</li> <li>▪ They work most efficiently at warmer temperatures (above 6-7°C) at which they are up to 2-3 times better than standard electric hot water cylinders; however, they may not be suitable for very cold climates. They are particularly suitable for temperature to warm climates where solar is not appropriate (e.g. where there is a shaded roof or installation of solar would be difficult).</li> <li>▪ Although they are a lot more expensive to purchase than a standard electric hot water cylinder, their efficient operating costs mean that they are a good investment.</li> <li>▪ Not all systems are created equal – Consumer New Zealand (<a href="http://www.consumer.org.nz">www.consumer.org.nz</a>) has looked at their efficiency and recommended some systems ahead of others. The cheapest system could be a lot less efficient than one that costs only a little bit more.</li> </ul>

Solar hot water	<ul style="list-style-type: none"><li>▪ These are the type of hot water system most commonly recommended by Beacon.</li><li>▪ A good installation should be able to deliver 75% of hot water heating for free, throughout the year, in most of the country.</li><li>▪ There are two types of systems – one where the solar panel and cylinder is on the roof (a thermosiphon system) and one where the hot water cylinder is inside the house (an active system). Beacon generally does not recommend thermosiphon systems because there can be a lot of heat lost from the hot water cylinder being placed outside on the roof.</li><li>▪ Solar hot water cylinders are larger than conventional hot water cylinders (normally around 300 litres) but, in colder areas, it is recommended that you get a system with the cylinder inside, or there will be more need for boosting.</li><li>▪ Boosting can either be done by gas or electricity, and in areas with low winter sunshine, a combined solar/wetback system can give year-round hot water.</li><li>▪ Because of the energy and greenhouse gas emission savings from using solar hot water, there are government subsidies available for their installation. Subsidised systems are listed on the EECA website (<a href="http://www.solarsmarter.govt.nz">www.solarsmarter.govt.nz</a>).</li><li>▪ Solar hot water is most easily incorporated into a new house, and they can be expensive to retrofit.</li></ul>
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### Tips for efficient hot water systems

- Adjust the thermostat on your hot water cylinder so that is at 60°C – higher than this wastes a lot of energy, and will mean you have dangerously high temperatures at the tap.
- If you have got an electric hot water cylinder – regardless of its age – it is worthwhile installing a hot water cylinder wrap and lagging the first metre of hot water pipe coming out of the cylinder.
- Switch off your hot water cylinder if you're away for more than two weeks.
- If designing a new hot water system, try and aim for short pipe runs – where your hot water source is located close to the kitchen, bathroom and laundry.
- If you change hot water systems from a low pressure to a mains pressure system (this is normal if you replace your hot water cylinder), make sure you install a water efficient shower head and tap aerators at the same time.

#### For more information:

- See Fact sheets on
  - Solar hot water systems
  - Heat pump hot water systems
  - Choosing between solar and heat pump hot water systems
  - Using less water
- Visit the Energywise website for general information on [water heating options: www.energywise.govt.nz/how-to-be-energy-efficient/your-house/hot-water](http://www.energywise.govt.nz/how-to-be-energy-efficient/your-house/hot-water) .
- Visit the Smarter Homes website for more information on saving with your water heating: [www.smarterhomes.org.nz/energy/water-heating/](http://www.smarterhomes.org.nz/energy/water-heating/)