

INFOSHEET 4

Hot water in schools

Heating water for domestic use in schools can consume significant amounts of energy. Approximately 30% of a school's expenditure on gas is due to domestic water heating.

A supply of domestic hot water is produced in schools by a range of systems including:

- centralised boilers with a network of pipes to distribute hot water to points of use;
- gas or electric domestic storage hot water services (some small systems are under benches);
- gas or electric continuous flow hot water heaters;
- solar hot water services with gas or electric boost; and
- boiling water units (often wall mounted and used for hot drinks).

Heating water with electricity is generally more expensive and creates more greenhouse gas emissions than using gas.

ENERGY SMART HOT WATER STRATEGIES

Energy is wasted if:

- more water is heated than required;
- insulation of storage systems or pipes is poor;
- thermostat temperatures are set too high; and
- maintenance has been poor.



Reduce hot water consumption

If less hot water is used less energy is required:

- Repair any dripping taps. A tap dripping 45 times per minute wastes about 1000 litres of hot water a month and costs over \$25 p.a.
- Install flow restrictor disks in showers and other water outlets where flow is excessive. These disks fit in the pipe work behind the shower rose and reduce the water delivery from 20 litres to 6, 9 or 12 litres/minute.
- Ensure dishwashers and washing machines are not used until fully loaded. This saves wear and tear on the machines as well as water and energy.
- Fit aerators to taps over sinks to reduce hot water usage.

Energy wastage

- Reduce energy losses by setting the hot water temperature on storage units to 60°C.
- Improve the insulation of the distribution pipe work. Adding extra insulation to electric hot water tanks also saves approximately \$1.50 per week.

Centralised boilers

Hot water in many schools is supplied from a centralised gas-fired boiler, often located with larger space heating boilers. These systems use gas for water heating and electricity for pumps. Energy losses can occur in the heat exchange tanks and throughout the network of pipes that distribute hot water around the school.

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If the system is in good condition check for the following opportunities to save energy:

- Ensure the boiler and pumps do not run when not required. For example weekends and holidays. Fitting a 7-day time clock is usually very cost effective.
- Ensure the temperature in the storage tank is at 60°C (no higher).
- If the temperature of the water delivered from taps is more than 3°C lower than that of the tank then have a contractor re-insulate the distribution piping.
- If the system is old and/or in poor condition consideration should be given to its replacement with a number of smaller high efficiency water heaters located near to where hot water is used.



Centralised domestic hot water system

Storage hot water heaters

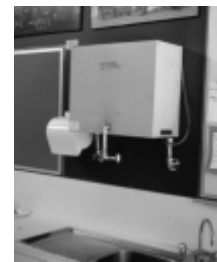
Storage hot water units may be gas or electric and range from 30 litres to 400 litres in capacity. Often small electric units are located under benches near sinks and larger units in store rooms or cupboards.

- Switch off any water heaters located where hot water is no longer required.
- For peak rate electric hot water services fit a timer switch to limit operation at night and on weekends.
- Switch off both gas and electric hot water heaters during holidays. For gas hot water heaters turn pilot lights off.

Boiling water for drinking

Large boiling water units are commonly found in school staff rooms and can cost up to \$400 per year to run. Fit plug-in timers on units to save on overnight and weekend energy use.

- In small staff rooms or student common rooms use 5.0 or 2.5 litre units fitted with a timer, or use an electric kettle.
- Use small plastic urns which have much lower heat losses in place of large metal urns.



Large boiling water units are common in staff rooms

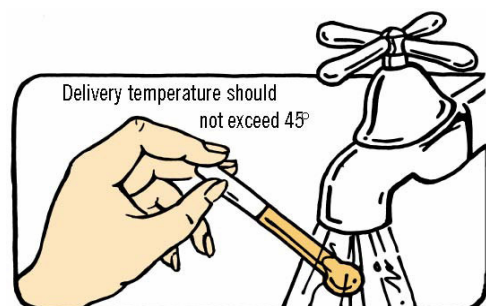
UPGRADING SCHOOL HOT WATER SYSTEMS

New regulations

To protect students and staff from scalding, new regulations now limit the delivery temperature of domestic hot water in schools. For new or replacement installations, the temperature of the hot water at the outlet of all sanitary fixtures used for personal hygiene in early childhood centres, primary schools, secondary schools and those for disabled persons, must not exceed 45°C. Compliance with this regulation is optional for kitchen sinks and laundry tubs such as those used in Home Economics rooms.

The temperature at which domestic hot water is stored remains at the recommended 60°C so as to inhibit the growth of legionella bacteria. Remember: heating water to higher temperatures is a waste of energy.

Where domestic hot water is heated and stored, a thermostatic tempering valve can be fitted at the hand basins or near the storage heater. These valves mix in cold water and limit the temperature of the water flowing from the hot tap. If continuous flow hot water heaters are installed, tempering valves may be unnecessary, provided the heater allows the correct temperature to be set.



New systems

When purchasing new hot water systems consider installing a solar-boosted water heater or buy 5 or 6 star energy rated gas hot water heaters.

Buy units that are sized to meet the likely load. A unit that is larger than needed will heat water unnecessarily.

If a central hot water system is not supplying a large demand, such as showers, it is worth considering replacement with a number of small efficient hot water services located near the points of use.

In many school applications, efficient instantaneous gas hot water heaters provide an excellent choice.

Star ratings

All gas hot water systems display energy labels with star ratings for energy efficiency. The more stars, the more energy efficient the water heater and the lower its operating costs.

Buy a properly sized hot water system

It is essential to purchase a correctly sized hot water system. Oversized systems cost more to purchase and run, and can take up valuable space. Undersized systems will not provide sufficient hot water for your needs. Accurate sizing is especially critical if using electric off-peak storage systems—if you run out of hot water, you will need to reheat it using the more expensive peak electricity rate.

Site hot water heaters properly

No matter what the quantity of hot water you need, or the rate of hot water use, it is important to site the water heater so as to minimise the pipe run to the outlet. Shorter pipe runs minimise the heat lost through the pipe itself, and also amount of 'dead' cold water in the pipe which needs to come out of your hot tap when the tap is turned on.

All pipework should be fully insulated with quality pipe insulation (such as Armaflex, Bradflex or Insulzip). Ordinary lagging is insufficient.

Star Ratings

A full list of gas water heaters and their star rating is available at the Australian Gas Associations Website: www.aga.asn.au. To access the list, activate the *Product Certification* dropdown menu and click on the *Certified Product Directory* link. On this next page click on the *2003 Directory of Certified Gas Appliances and Components* link.

Solar hot water

Schools should also consider the installation of solar hot water for either a new or replacement systems.

By using renewable energy where hot water demand is high (for example home economics rooms or showers) significant energy cost and greenhouse savings can be achieved.

Solar hot water systems come in a variety of configurations and sizes with either electric or gas boost. Further information about solar hot water can be found at www.sustainability.vic.gov.au.

The Victorian Government currently offers rebates on solar hot water systems. These rebates are now available to schools and community groups making solar hot water more financially attractive.

For more information about solar hot water rebates visit www.sustainability.vic.gov.au.



Choosing the right type of system

If natural gas is available to the school, it should be used for hot water heating. The most appropriate hot water system depends on hot water consumption. Many schools only use small amounts of hot water, for washing hands, dish washing, and in home economics and science teaching areas. Provided that draw off of hot water is less than 24 litres per minute (roughly two taps running simultaneously), a continuous flow water heater is recommended.

Where hot water is required for only one or two basins a small electric continuous water heater is appropriate.

If hot water draw off is greater than 24 litres per minute, a gas storage unit may be best or multiple continuous flow hot water heaters can be installed.

Off-peak electric units are also economic, provided they are sized so as to supply all your hot water requirements from overnight, off-peak electricity. If any reheating during the day (i.e. on the peak electricity tariff) is required, costs are five times as high as during off-peak times. If 25% of your hot water is heated at peak rates, your hot water costs will double. Your storage tank has to be large enough to supply all of your day's requirements to avoid peak electricity costs for reheating.

The chart overleaf provides a step-by-step guide to choosing an appropriate hot water system for a school.

ENERGY PRICING

All operating cost quoted in these info sheets are based on a standard school day and are approximate only. The operating costs are based on an assumed peak electricity tariff of \$0.16/kWh, natural gas tariff of \$0.95/MJ and a LPG price of \$0.70/litre. Schools should check with their electricity and gas retailer for tariffs applicable to their particular schools.

