

Swimming pool efficiency

This pool guide will give you tips to reduce the energy costs and water usage of your swimming pool or spa, and help you choose the right pool and equipment for your backyard.



Ausgrid and the Swimming Pool & Spa Association (SPASA) NSW have put together some information to help you save money by reducing your water and energy use while you enjoy the pleasures of a backyard swimming pool.

What you can do

- **Be water wise all the time.** A swimming pool can be an inspiration for households to become more water wise – what better reward for efficient water use than being able to splash in a pool.
- **Position the pool** to minimise evaporation and save on heating costs.
- **Install water saving products** such as rainwater tanks to top up the pool without using mains water.
- **Install a pool cover** to save water, energy and maintenance efforts.
- **Reduce energy costs** of swimming pool pumps. It's easy if you install a smart meter and

switch to time-based pricing. You may be able to slash pool electricity bills by up to \$209¹ a year.

- **Experiment with pumps and filtration** times to eco-optimize your pool's maintenance regime.
- **If you use pool heating,** investigate options with the lowest ongoing running cost and greenhouse gas emissions.
- **Invest in timers** to make maintenance simple and adaptable to different seasons.

There's no 'one-size-fits-all' approach to creating a water and energy efficient swimming pool or spa. The local climate, wind and humidity have a big impact on the environmental performance of a swimming pool or spa. Responsible pool owners can easily adapt existing pools to become more energy efficient and waterwise. Prospective pool owners should carefully weigh up their needs and consider installing energy efficient equipment where possible.

Pool size, design, location and equipment all influence the water and energy needs of a pool or spa, and the following factors should be considered.

- **Larger pools use more water and require more energy to filter.** Consider what use you want to get out of your pool and the size you require for your family's needs. For example, do you need a shallow splash area for the kids combined with a spa for adults? Think about the ways to reduce water volume while retaining maximum pleasure and enjoyment from the pool.
- **Shading and exposure to the wind affects the water temperature and water use.** Will the pool be indoor or outdoor? Does it need to be used only in summer or all year round? How much direct sun will the pool receive in summer and in winter?
- **Pool heating options.** It's a nice idea to have a warm pool but make sure you consider the associated costs and greenhouse emissions before you choose. Consider solar heating in

conjunction with a pool blanket, as a great way to keep down costs and decrease greenhouse emissions. Even something as simple as the right position can raise the temperature of your pool. Gas heaters and heat pumps can certainly warm any pool quickly. Make sure you speak to the experts in order to have the pool heated to suit the location and your needs.

- **Equip the pool or spa with the most energy efficient pump, filtration and cleaning system.** It's important to weigh up the long-term running cost of cheaper, inefficient technologies. A quiet, efficient pool pump combined with an efficient filter and piping system is likely to be the best option.
- **Lighting a swimming pool** is a great way to keep it safe at night, but be careful not to over light outdoor areas and add to your electricity bill. Choose energy efficient lighting options, such as CFLs and LEDs and use as few light fittings as possible.

¹ Savings estimated based on using a 750 Watt (1.0hp) pool pump on average for six hours a day in the summer and four hours a day in the winter during off peak periods with time-based pricing.



Pool efficiency

The Swimming Pool & Spa Association's top ten tips for managing your pool

- 1 Install a pool cover to reduce evaporation and need for filtering.
- 2 Regularly check the plumbing around the valves and pipe joiners for leaks, especially in older pools.
- 3 Discourage excessive splashing and display 'no diving' signs prominently around the pool.
- 4 Keep pools properly filtered and chemically balanced.
- 5 Ensure the water level is only half way up the skimmer opening.
- 6 Regularly clean the pool, skimmer box and the other collection points.
- 7 Keep animals out of the pool.
- 8 Ensure pool equipment is working correctly.
- 9 Siphon off excess water after rain and use for watering the garden.¹
- 10 Upgrade the filter to a more water efficient model, such as a cartridge filter.

¹ Some sanitisers and chemicals used in pools may affect garden vegetation and soil. Please check the contents of these before using pool water on your garden.



Every drop counts

We all know water is precious, especially during a drought. Pool owners can adopt simple tactics to minimise their environmental impact and maximise enjoyment of a pool.

Location, location, location

Most swimming pools and spas will lose water through evaporation. Using a pool cover and positioning a well-designed windbreak will lessen the environmental impact.

Position

Water that receives direct sunlight will be warmer to swim in and need less artificial heating. Contrary to popular belief, hot sun is not the sole culprit of water evaporation. A pool's water temperature, the humidity and wind speed at the pool surface all influence evaporation. Basically, the higher the wind speed and the lower the humidity, the greater the evaporation rate.

Windbreaks

A line of trees, a wall, a solid fence or even a screen, can dramatically reduce the evaporative water loss by reducing wind speeds over the water. Whilst a windbreak can offer protection from evaporation and provide cover, you don't want the windbreak to shade the

pool completely from the sun's natural heating. If using trees or shrubs for a windbreak, be sure to choose non-deciduous or evergreen plants and keep them neatly trimmed to reduce the amount of plant debris which could end up in the pool.

Equipment

Pool equipment should be located in a place that will minimise the impact of noise; away from your living spaces and from your neighbours. Consider enclosing your pool equipment to further reduce the noise and potentially allow you to run your pump overnight to make the most of cheaper electricity rates.



Pool filtration system

Filtration systems generally consist of a pump that circulates water from the pool through a filter and returns the cleaned water to the pool.

How long you should filter a pool depends on:

- the size of the pool,
- the filtering equipment,
- how much the pool is used, and
- varying environmental factors, such as sunlight or wind hitting the pool.

The more people who swim in the pool the more filtering it will need. It is recommended that you run the filter for four to six hours a day in summer, and two to four hours a day during the winter. If you are filtering your pool for longer than this, start reducing the daily filtering time by 30 minutes. After a week, if the water clarity and chemical balance is fine, try reducing filtering time by another 30 minutes.

Setting filtering times

A filter timer is an easy way to manage pool filtering. Just be sure to check it once a month. To make sure it's working properly, closely follow the instruction manual to set operation times. Remember to reset the timer clock after power outages and for daylight savings.

Different types of filters

Cartridge filters

These use a cartridge as the filter medium and don't need to be connected to a sewer or waste line. They can be installed before the pump, and if necessary inside an oversized skimmer box when space is restricted. Cleaning is simply a matter of removing the cartridge and hosing it off. These are usually the most water efficient filters to use in a swimming pool.

Media filters (sand & glass)

A popular but water-intensive option, these units force the pool water through a tank filled with sand, glass, zeolite or other types of media. Over time, impurities restrict the flow and the pressure gauge will indicate backwashing is required. Backwashing reverses the water flow and sends the unwanted waste down the drain. Some filters allow automatic backwashing, which means the filter always operates at peak efficiency.



Diatomaceous Earth (DE) filters

The water clarity achieved by a DE filter is excellent but they are expensive to buy and maintain. The DE filters use fossilized diatoms, which are like coral, to trap fine particles during filtration. Backwashing is the same as it is for sand filters, but some parts may need to be washed once or twice a year to remove any calcium that may have built up.

Filter types

	Cartridge filter	Sand (Media) filter	Diatomaceous Earth (DE) filters
Considerations	<p>Concertina shaped filter areas provide a large filter surface within a relatively small housing.</p> <p>No provision for backwashing.</p> <p>Must be removed for cleaning. Filter cartridges are generally hosed off. Those used in a heated pool or spa may need to be soaked in cleaning solution.</p> <p>Ideal for use in unsewered areas or where disposal of waste water is a problem.</p> <p>Will normally remove particles down to approximately 10 microns in size.</p>	<p>Most commonly used filter on both domestic and commercial pools.</p> <p>The high rate sand filter has one grade of sand – either 16:30 or the finer grading of 18:30 and the sand bed is 200–310mm (8–12 inches) deep, depending on the size of the tank. There are other types of media used in sand type filters such as glass and zeolite.</p> <p>Requires backwashing to clean, which produces waste water.</p> <p>Requires changing approximately every 5 years, dependent on pool usage, size etc.</p> <p>Will normally remove particles down to approximately 15 microns in size.</p>	<p>Diatomaceous Earth is a powder made up of finely crushed coral-like rock.</p> <p>Requires backwashing to clean, which produces waste water.</p> <p>The DE filtering cake erodes during use and must be replaced after every backwash.</p> <p>Can remove particles down to approximately 2 microns in size.</p>

Pool equipment

Cover up

A pool cover is one of the best investments any pool owner can make. It extends the swimming season by keeping the water warm and prevents water and energy loss through evaporation. If you have a heated pool, a well-fitted pool cover can immediately save up to 50 per cent on energy costs.

A pool cover can:

- **Reduce evaporation:** Pool covers keep evaporation to a minimum. A pool can lose up to 5mm of water every day due to evaporation. By regularly using a pool cover you can reduce this loss of water by up to 95 per cent.
- **Improve water cleanliness:** Up to 90 per cent of debris like dirt leaves and insects can be kept out of the pool with a well-fitted pool cover. This also improves the quality of your pool water and reduces the load on the cleaning system.

- **Reduce the total cost of pool chemicals:** Fitting a pool cover may also reduce the amount of pool chlorine lost to the sun's UV rays.
- **Extend your swimming season:** Covers can increase the pool temperature by around 6 to 8 degrees in pools that receive sunlight.
- **Help indoor pools too:** Even indoor pools suffer evaporation, often requiring additional room ventilation to control indoor humidity. The added energy cost of air-conditioning or mechanical ventilation can be reduced by using a pool cover and ventilating with fresh air from open windows and doors.

Types of pool covers

Bubble covers: Solar bubble covers are light coloured, allowing maximum solar energy to penetrate the pool and warm it. The air-filled bubbles form an insulating layer which prevents the warmth from being lost again. The cover needs to be removed and replaced regularly, so a roller is advisable. If the cover is left rolled up in the sun it must be covered to prevent damage from overheating.

Thermal blankets: Thermal blankets are designed to insulate the pool overnight by reducing evaporation and convection heat loss. They are not as thick as a bubble blanket, and a roller is still necessary.

Liquid pool covers: These work by forming a liquid barrier on the surface of the pool. They don't need to be on a roller or removed and replaced as a traditional cover does. They are made from biodegradable ingredients which slow heat loss and water evaporation without affecting the chemical balance of the pool.

Slat covers: These covers have slats, which roll out onto the pool surface, similar to a horizontal garage door. When fully extended, the slats form a barrier that can support the weight of a small child or pet. Another variation achieves the same result by using sturdy material supported by metal rods at regular intervals. Because they are thermal insulators, both options operate like a thermal blanket. They reduce overnight heat loss and evaporation. Although slatted covers are usually installed during construction, they can also be retrofitted to existing pools.



An example of a thermal blanket

To heat or not to heat

Energy efficient pool heating

Pool and spa heating can extend the swimming season beyond the summer months but can add to your energy consumption and your home's carbon footprint. The lowest-impact form of pool and spa heating is solar, followed by gas and heat pump pool heaters, but all options should be backed up with sensible efficiency provisions, such as using a pool cover.

Solar heating

This is the least greenhouse intensive way to heat your pool. It may allow you to use it for an extra four months of the year but in many cases, it will not provide year-round heat.

Installing a temperature-sensing solar controller and using a pool cover will increase the benefits and efficiency of solar pool heating.

Solar heating systems vary, but most include:

- **A solar collector** where pool water is circulated and heated by the sun. The solar collector is generally located on the roof so it needs space and requires good solar access to maximise the heat collected.
- **A filter** which removes debris before water is pumped through the collector.

- **A pump** which circulates water through the filter and collector and back to the pool.
- **A flow-control valve** which is an automatic or manual device that diverts pool water through the solar collector.

Solar heating systems are generally classified as independent or integrated systems. An independent system typically has separate pipes and a pump solely used for circulating water through the solar collector. An integrated system uses the existing filtration system and pump with a diverter valve to control water flow through the solar collector.

Heat pumps

Heat pumps are powered by electricity and use the same efficient technology as inverter air conditioners to produce heat. Heat pumps gather heat from the surrounding air, so they are usually installed outdoors. The position of the heat pump needs to be considered as they can emit some noise.

Connecting the heat pump to a controlled load electricity supply or switching to time-based pricing and running in off peak times can reduce the running costs significantly.



An example of a heat pump

Gas heating

Gas heating is one of the quickest pool heating methods and a great choice for spas. Selecting the right heater depends on the size of the pool or spa, the maximum temperature you want and the speed you want it to heat up. Controls range from the basic to the very sophisticated, so seek expert advice and consider your budget, lifestyle and what will best match the way you use your pool or spa.



Pool heating



Heating types			
	Solar pool heating	Heat pump pool heating	Gas pool heating
Considerations	Enough roof space is needed with good solar access to maximise the benefit. May require the installation of a separate pumping system and controller. Solar heating will most likely only extend the swimming season by several months on either side of summer and provide higher temperatures during the main swimming season. Has the cheapest annual energy costs of all heating options.	A heat pump heater only requires connection to the electricity supply and is a good option when gas is not available. However, running times and emitted noise should be considered when deciding on an appropriate location. Heat pump water heaters are more energy efficient than gas heating options with lower annual heating costs, especially when combined with cheaper electricity tariffs such as controlled load or running in off peak times with time-based pricing.	A gas heating system requires connection to the natural gas network, so may not be a good option for everyone. Gas heating can provide large amounts of heating capacity with the ability to heat your pool or spa quickly and on demand when compared to other heating options. However, compared to solar or heat pumps, the energy cost can be quite high.
Estimated daily energy usage ¹	6kWh	43kWh	786MJ
Estimated weekly energy cost ²	\$8 to \$9 (Block Tariff)	\$60 to \$62 (Block Tariff)	\$131 to \$212 (Block Tariff)
	\$4 (Time of Use Tariff - Off Peak Period)	\$28 (Time of Use Tariff - Off Peak Period)	
	\$7 (Time of Use Tariff - Shoulder Period)	\$50 (Time of Use Tariff - Shoulder Period)	
	\$16 (Time of Use Tariff - Peak Period)	\$118 (Time of Use Tariff - Peak Period)	
Greenhouse gas emissions ³ (kg per week)	40kg	290kg	354kg

1. Estimates of daily energy usage for gas and heat pump heating systems are based on providing enough heat to raise the temperature of a 50,000 litre pool by 3 degrees per day (assumed to be the average temperature loss per day for a standard sized outdoor pool). Solar pool heating weekly energy costs are based on running a 500 Watt (0.75hp) solar pump for 8 hours a day on average.
2. Estimates of weekly energy costs are based on typical market rates from major energy retailers for residential customers in the Ausgrid electricity network area and Jemena gas network area from 1 July 2015.
3. Greenhouse gas emissions are calculated using the National Greenhouse Emissions Factor of 0.96kg/kWh for the full fuel cycle of electricity generated in NSW and 0.0643 kg/kWh for the full fuel cycle of natural gas delivered to customers to NSW metropolitan areas, published by the Australian Government, Department of Environment of the National Greenhouse Accounts (NGA) Factors, August 2015.

Waste not

Harvesting rain water to top up the pool is a great way to reduce a pool's use of communal water resources. There are innovative devices such as downpipe diverters which can deliver rainwater from your roof straight into the swimming pool or spa.

A fixed rainwater tank is a better, more permanent system to collect top-up water. Building a drought-proof supply of water to maintain a swimming pool in all weather conditions can be a great investment, especially if you pump the rainwater to a

laundry or toilet as well. This will increase your household's overall water efficiency and save money on water bills in the long-term.

There are a range of products for permanent water harvesting and storage, such as:

Above ground rainwater tanks made from corrugated iron, steel or lightweight polyethylene. They are available in a variety of sizes, colours and shapes. Slimline tanks are ideal for small city yards.

Underground tanks which can be installed under the lawn, driveway or paved area and when used with a pump can be used to top-up the pool or plumbed into the toilet or laundry to maximise rainwater usage.

Space-saving bladders which can be used to store rainwater under an elevated house or deck. They are made from flexible material and have high puncture resistance.

Portable tanks and bladders which are made from flexible reinforced fabrics, are completely portable and fold up for easy storage. There are a number of companies that hire out bladders for temporary water storage, such as when you are renovating a pool.

Banish leaks

If water levels in the pool seem to drop abruptly, investigate for leaks. A leaking pool will not only waste water and money but could undermine the foundations of the pool. If you suspect a leak, turn off the automatic top up system and use tape or a pencil to mark water lines and monitor the water level.

Being observant is the best way to identify and stop a leak. Look for increases in your water bill as well as changes to the pool area and the water itself. A leak will either be a static leak – losing the same amount of water all the time – or a pressure leak which causes water loss when the filter system is running.

If you suspect a leak, it's worth doing a quick DIY check before calling for service. You should check:

- **Wet areas around the pool.** Take a walk around the pool's edge, and look between the pool and the equipment pad. Check for wet soil and eroded areas.
- **The plumbing, valves, pipes and joints for leaks.** One drip per second can waste up to 7,000 litres of water per year. A steady dribble could waste hundreds of thousands of litres per year which adds to your water bill.
- **Is the pool leaking only with the equipment on?** With the filter pump on, the plumbing may be under pressure, turning

small drips into spraying gushers. Check the waste or backwash line for water running all the time.

- **Is the pool leaking only with the equipment off?** This could indicate a suction leak. With the filter pump on, the plumbing on the suction side is under vacuum and air can be drawn in through leaking voids. You may notice air in the pump basket, air bubbling out of return lines or air repeatedly built up inside the filter tank.
- **Does the pool leak all the time?** Look for cracks in the lining or tears in the vinyl of the pool sheet. Look closely at the tile line and inside the skimmer to investigate. It may still be a plumbing leak, but it's worth checking these items too.
- **Underwater lights, which can and do leak,** especially the conduit that runs from the light niche to the junction box. Filling the opening of the conduit in the back of the light niche with putty, silicone or caulk can fix this problem.



Pool savings

Save energy and money

Pools and spas are one of the largest energy users in a home after the hot water service and air conditioning, so there's plenty of scope to take simple measures to save money.

The ongoing electricity, gas, water, chemical, maintenance and service bills for a pool or spa can add up to \$30 or more each week.

One of the easiest ways to help keep costs down is to check whether your energy provider offers incentives to use electricity out of peak times. Instead of running equipment during peak times, you could run it during shoulder and off peak times and save up to \$209 a year.

Pool and spa-owning households can install smart meters, sometimes free of charge, to take advantage of cheaper rates for electricity used out of peak times. See how much you could save in the table below.

Off Peak and Shoulder tariffs are not just great for pools, you could save even more money if you start using other appliances outside peak times, such as dishwashers or clothes dryers.

Invest in efficiency

The larger the pump, the more power it uses so it's a good idea to install the smallest pump needed for your pool. Generally, a 750 Watt or smaller pump is

sufficient for residential pools but it's a good idea to have your equipment inspected by a licensed pool and spa technician to ensure your equipment is operating optimally.

The voluntary energy rating labelling program for pool pumps can be used to help identify the most energy efficient models. If you are replacing your pool pump, seek expert advice about the best size and efficiency for your pool filtration system.

Pool owners can also improve a pump's performance by up to 40 per cent by installing a larger filter, rated at least 50 per cent higher than the pool's design flow

rate and increasing the diameter or decreasing the length of the pipes and replacing 90 degree elbow pipes with 45 degree angles or flexible pipes. Low horsepower pumps move water effectively and consume less electricity but will need to run for longer.

Consider installing a multi-speed or variable speed motor with an automatic controller, which allows for a multitude of tasks such as vacuuming, water turnover, automatic pool sweeping and pump operation. Once a particular task is done, the controller can automatically default to a preset lower speed to accommodate the pool's daily filtration cycle, saving energy and money.

Pool pumps are often left to run longer than necessary because people fear the chemicals may become imbalanced, allowing

algae growth to bloom. This may not be prevented by prolonged filtration or circulation. In most cases six hours a day in the summer and four hours in the winter is all that is needed.

It helps to install a timer to set the optimal pump run times for different seasons. Running the pump continuously for 6 hours leaves another 18 hours each day for the pool to collect debris. Several short cycles, such as three, two-hourly pump sessions, keep the pool cleaner all day.

Maintain for efficiency

Clogged grates require the pump to work harder, which uses more energy, so it's a good idea to keep intake grates free of debris. Backwash pool filters according to manufacturer specifications or switch to a filter that doesn't require extensive backwashing, which can waste water.

Reduce running times

It's important to find the optimum filtration time for your backyard swimming pool to ensure energy is used most efficiently. One complete turnover of water every 24 hours provides adequate filtering for a residential pool.

Estimate of annual savings¹

	Domestic Electricity Tariff	Time of Use Shoulder periods 7am–2pm, 8pm–10pm Weekdays 7pm–10pm Weekends	Time of Use Off Peak periods 10pm–7am
Running cost (\$/yr)	\$388	\$319	\$179
Savings (\$/yr)	N/A	\$69	\$209

¹Estimations based on using a 750 watt (1.0hp) pool pump for 6 hours a day in summer and four hours a day in winter (electricity consumption of 1945kWh pa). Estimates are calculated using a typical electricity market rates from major energy retailers for residential customers in the Ausgrid electricity network area from 1 July 2015. To find out more about the estimated annual energy usage and environmental impact of your pool pump, visit www.ausgrid.com.au/save

Maintain – sustain

The most eco-friendly actions a swimming pool owner can take are to:

- **Reduce water consumption** by topping up the pool with rainwater and using a pool cover to reduce evaporation and help maintain the water quality.
- **Reduce energy costs** by installing efficient pumps and filters. Also check with your local pool shop about installing a quieter pool pump and contact your retailer to find out how you can move to time-based pricing.

A pool and spa's maintenance requirements change, depending on the time of the year and how often it is used.

Here's a guide to summer and winter maintenance to get the most out of your pool or spa with a minimum of cost and effort.

Winter maintenance

Just because the weather has turned cool doesn't mean the pool should be erased from memory until summer. By following a few simple procedures, your pool will be ready to dive into the very first hot day of the season.

SPASA's winter maintenance guide:

1. Thoroughly backwash the filter and clean it with a recognised filter cleaner and degreaser.
2. Ensure that the skimmer basket and hair and lint-pot are free from debris.
3. Lubricate all O-rings with a silicone based lubricant.
4. Adjust the total alkalinity level with bicarbonate of soda if the level is below 80 and 120 parts per million.
5. Adjust the pH between 7.2 to 7.6 by adding acid if the level is too high or soda ash if it's too low.
6. Mix all chemicals in a full bucket of water before adding to the pool.

7. Mix 500g of granular chlorine or 750ml of liquid chlorine in a bucket of water and add to the pool.
8. Mix 750ml to 1L of a long-life algaecide that is specifically designed for winter. Add this to the pool.
9. Adjust the timer to allow the filter to operate for two to four hours each day, ideally outside of peak periods.

10. Salt chlorinated pools need the cells cleaned and control can be adjusted to the half-production setting. If using chlorine, ensure a constant level of 1 to 2 parts per million at all times.

Once you have winterised your pool you only need to:

- Check the chlorine and pH levels every two weeks.
- Empty the skimmer basket when full.
- Check the water level is half way up the skimmer opening.



Pool maintenance

Summer maintenance

SPASA's summer maintenance guide:

1. Check and clean the skimmer basket and hair and lint-pot basket weekly. Do this more often if the pool is used frequently or when leaves and debris blow into the pool.
2. Backwash any sand or DE filters and clean cartridge filters. The frequency of filter maintenance also depends on how often the pool is used.
3. Check sanitiser levels, ideally on a daily basis and add sanitiser to maintain minimum levels. Check the operation of salt chlorinators or automatic systems. The more people that use the pool, the more sanitiser is required to kill algae and bacteria. If using chlorine, a level of 2 to 3 parts per million is required.
4. Check the pH every two or three days. It is a good idea to mix all chemicals with a full bucket of water before adding to the pool. Remember to always add the acid to the water and never in amounts more than 500ml.
5. Check the Total Alkalinity (TA) weekly. Adjust the total alkalinity level with bicarbonate of soda, or buffer, if the level is below 80 to 120 parts per million.
6. Check and adjust the timer to allow the filtration system to operate for six hours each day. Most people run their filtration system for three periods of two hours daily.
7. Take a sample of pool water to the local pool shop every two to four weeks during swimming season to make sure the water balance is correct.
8. Salt-chlorinated pools may need additional salt (a local pool shop can confirm the levels needed). The production control on the salt chlorinator may have to be adjusted to increase or decrease its output.
9. Maintain the water level at least half way up the skimmer box opening.
10. Inspect plumbing for leaks.
11. Vacuum the walls and floor regularly.





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For more information on how to save on your energy bills, visit our website at www.ausgrid.com.au/save or call 13 13 65.



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