

## Water Heating Frequently Asked Questions

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### Costs and savings

#### How much can I expect to save?

##### **What you need to know:**

Typically payback periods for standard flat plat collector close-coupled Solar Water Heaters is between 3 and 6 years depending on water consumption and how you're financing the system.

##### **Additional information:**

The answer varies for every household, depending on the model purchased, how much hot water is used, and other factors. The general guideline is that a solar water heater can typically save up to about 60% of your hot water bill as your geyser accounts for the majority of your household consumption.

Generally speaking, if you are using 450 kWh or more per month for electricity – then you are likely to make significant savings from a solar water heater.\* Households spending less can also save significantly, but behaviour will be a bigger factor to consider.

Savings will vary from month to month based on household usage patterns (e.g. visitors, holidays, travel, etc.) and seasonal weather.

As tariffs could increase steeply in years to come, the savings will only increase.

Be careful to avoid the 'rebound effect': this is when households unconsciously use more electricity on other things or even take longer showers because they know their water is now heated by sun and that they are saving so much electricity, and so do not experience the anticipated savings.

*\*Every household is different. All figures given are only indicative and can change over time.*

#### How do I maximise savings from my solar water heater?

**The best ways to maximise your electricity savings through your solar water heater are:**

- Install the [correct size system](#) for your home and family's needs to start with.

- Use hot water in your home efficiently. This means good habits of short showers (rather than big baths) and help from technology like installing efficient, water- saving shower heads and tap aerators on all showers and taps in the household.
- Ensure you have a timer installed to boost the heat of the water (if required) just prior to using it. [See "What times should the electrical backup be set for, and why?"](#) for more information.
- If you want to take saving really seriously, you can opt to turn your system's back- up element off and live with cooler water when the sun's energy cannot be used to re-heat water in your geyser e.g. very cloudy days or for morning showers when all the hot water was used up the night before.
- Regularly clean your solar collector panel, so that the maximum amount of sun's energy can always be absorbed.
- Service your solar water heater regularly according to the manufacturer's recommendation.

## How much does a solar water heater cost?

The price of a solar water heater varies based on size, quality, complexity of installation, configuration of solar water heater, whether a service contract is included, warranties, certifications (plumbing or electrical compliance certificates), and other factors.

The cost for a typical direct, thermosiphon, close-coupled system with a flat plate collector including VAT and installation is between R15000 – R35000.

**For more information refer to question "What are the different system options and configurations for solar water heaters?" below**

## What subsidies or rebates are available?

Currently, there is no subsidy for solar water heaters or heat pumps available. The previous solar water heater rebate through Eskom was terminated at the end of April 2015.

## I'm not sure that I can afford to buy one now – surely I can wait a few years?

The sooner you get a solar water heater or hump pump, the sooner you start, the greater your savings will be. A Service Provider can provide information about the instalment finance facilities to you. Alternatively, you can consider renting the product – a small number of Accredited Service Provider's offer this option.

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## Product and installation quality

### Should I get a solar water heater to replace my burst geyser?

Yes. It's not great that your geyser has burst, but the good news is that this is the perfect opportunity for you to upgrade to a solar water heater or a heat pump.

If your geyser has burst, check out our [burst geyser upgrade guide](#) for easy step-by-step guidance. Even if your geyser hasn't burst it is always worth being prepared in case it happens – see this guide to plan ahead to get a solar water heater when your geyser next bursts.

## How can I be sure to get a proper, high-quality solar water heater installation?

Quality can be determined by many factors, including quality of components used and the installation itself. You should ask to see the SABS (South African Bureau of Standards) mark (or similar international certification) on all components used.

A proper quality installation is also essential. Installations must comply with SANS 10106 and SANS 10142-1, the national standards for installations. Certificates of Compliance (CoCs) for the plumbing work and a separate one for the electrical work will provide additional documentation of quality installation.

## What are the key factors/pointers for a good installation?

Your accredited provider will inform you of the best options for a good installation on your property, but it's always good to be informed. Here are several points that should be kept in mind to help ensure a good installation:

- Solar collectors must be orientated and inclined correctly during installation. In South Africa, collectors should face true north or slightly to the west to take advantage of higher irradiance in the afternoon. A deviation of 45° east or west is acceptable, but deviation greater than this will require larger collectors to compensate for solar losses.
- A rule of thumb for pitching the collectors is "latitude + 10°". This gives the best uniform solar collection throughout the year. Vacuum-tube collectors are less orientation-sensitive than flat-plate collectors. Additional framework may be required to achieve the desired angle for the collector.
- Solar collectors should be placed in an area of uninterrupted sunlight. If an area is in shade between 9am and 3pm, another position should be found. A simple rule is to position your collector a distance from the obstacle that is twice the height of the obstacle. Partial shading by obstructions such as chimneys.

## What kind of a guarantee should I be looking for?

Generally speaking a 5 year warranty on all major components is worth looking for. There may be exceptions for some smaller components, so the entire system may not have such a warranty, or you may need to pay extra for it. Some components are designed to be replaced, such as sacrificial anodes inside some hot water tanks (which help prevent rusting in some systems), so are often excluded from warranties. The tank and the collector normally carry a longer warranty of 10 years from the manufacturer.

## About solar water heaters and heat pumps

### What is a heat pump?

A heat pump takes heat out of the surrounding air, which the sun warms up daily – like an air conditioner working in reverse. It uses some electricity to power a small 'pump' that moves the heat, compressing it for greater effect, from the surrounding air into the geyser.

A heat pump, like an air conditioning unit, is a vapour compression cycle, and works on the same principles as a refrigeration cycle. Where an air conditioning unit is used to cool air with heat as a by-product, a water heating heat pump can use the heat generated to further improve its heating efficiency.

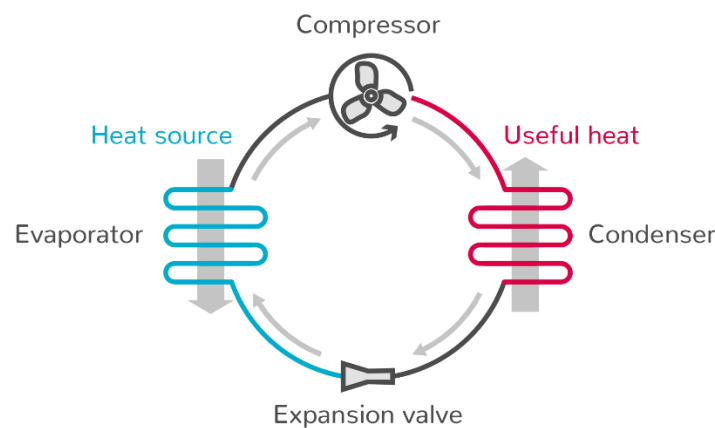


Diagram: How a heat pump works

A heat pump works during the day and at night, and does not need to switch to an electric element on cloudy days, like a solar water heater does. A heat pump uses some electricity to power a small 'pump' that moves the heat from the surrounding air into the geyser.

Heat pumps require regular annual maintenance (as do some solar water heaters).

There is currently no SABS standard for heat pumps, so judging the quality of any brand or model requires a bit more effort by the consumer. It is important to consider the warranty offered on any heat pump sold, as well as any international certifications of quality, among other factors.

Using a heat pump can typically save about 25% of your monthly electricity usage, similar to solar water heaters.

### Is a heat pump right for me?

#### Comparative advantages of a heat pump over a solar water heater:

- A heat pump works during the day and at night, and does not need to switch to an electric element on cloudy days, like a solar water heater does.
- Heat pumps can be the better option for houses with lots of surrounding trees that shade the roof, for flats and sectional title units, for old houses with roofs

that might not support the weight of a tank, and for new houses where there's no room for the tank in an attic space and the aesthetics of a roof-top tank is an issue.

- Heat pumps also perform well in coastal areas where fog and haze can limit the performance of solar water heaters.
- They are easy to install and take up less area than solar panels would to provide the same amount of hot water.
- A heat pump hot water system can be integrated with the HVAC system for further savings.
- It is an important technology for the commercial sector where large quantities of water are being heated and stored – such as in hotels and hospitals – and the energy savings offset the higher capital costs of the pumps.

**Disadvantages or barriers:**

- Heat pumps require regular annual maintenance (as do some solar water heaters).
- When the heat pump is operating it can be noisy depending on the model, its position and how it is mounted.
- Due to the fact that heat pumps are still dependent on a supply of electricity, they are not a feasible option for households that are not electrified and won't function if the electricity fails.
- There is currently no SABS standard for heat pumps, so judging the quality of any brand or model requires a bit more effort by the consumer. It is important to consider the warranty offered on any heat pump sold, as well as any international certifications of quality, among other factors.

*This information comes from Sustainable Energy Africa "Sustainable energy solutions for South African local government: A Practical Guide" (August 2017). You can read it online [here](#).*

**How does a solar water heater work?**

Solar water heaters use energy from the sun to heat water. A typical flat plate system is based on two facts of physics: dark coloured objects absorb heat, and hot water rises. The heat from sunlight is absorbed and transferred to the water, which is stored in a geyser or tank. There are two main types of solar water heaters, and they may be configured differently.

A typical system has three major components: a solar collector, a heat transfer medium and a storage container.

Solar collector	The solar collector absorbs the sun's energy and transfers the energy, in the form of heat, to the fluid within it.
Transfer fluid	This fluid is the transfer medium. In a direct system, the transfer medium is the potable water from the storage container. In an indirect system, the transfer fluid is generally a mix of water and

	glycol, which passes the energy to the storage container via an isolating heat exchanger.
Storage tank	The hot water storage container is thermally insulated to retain heat. Solar geysers are usually larger than electric geysers and better insulated. This allows you to maximise your solar gains.

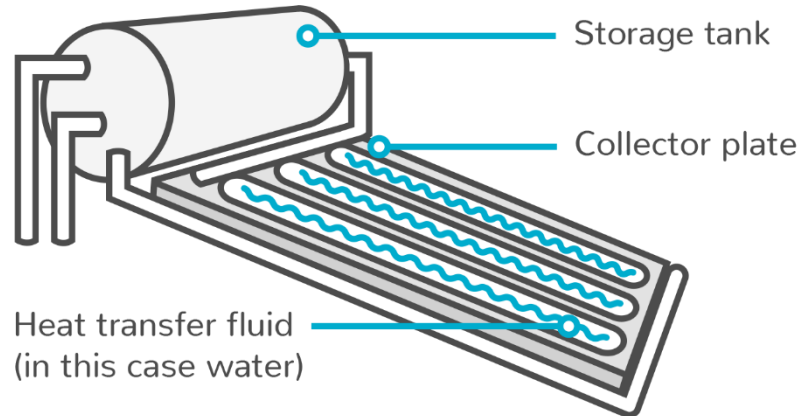




Diagram: A typical close-coupled flat plate

What are the different system options and configurations for solar water heaters?

- [Collector types and how to choose](#)
- [Direct vs Indirect systems](#)
- [Installation methods: Close coupled or split systems](#)
- [High pressure vs low pressure solar water heaters](#)

### Collector types

There are two main types of collectors: flat-plate collectors and evacuated or vacuum tube collectors

<p><b>A flat-plate collector</b> has a transparent cover made of specially toughened glass, a coated metal absorber plate (coating is usually matt black paint), and a well- insulated weatherproof casing. Flat collectors are robust, economical, and versatile.</p>	
<p><b>Vacuum-tube collectors</b> consist of a series of glass tubes connected together. The absorber strip in an evacuated tube collector is placed inside the toughened glass tube, which can withstand considerable pressure. The heat transfer fluid flows through the absorber directly in a U-tube or sometimes in a tube-in-tube system. Several tubes are connected to one another or to a manifold that makes up the solar collector.</p>	

A heat pipe collector contains a special fluid that vaporises at low temperature. The hot vapour rises in the heat pipes and warms the heat transfer medium in the main pipe before condensing and recirculating. The pipes must be at a certain angle to facilitate the process; too flat or too steep an angle and the system will not work.

*Vacuum-tube collectors pros and cons:*

Pros	Cons
Evacuated tubes generally create more hot water, especially when the sun is weak and the weather is cold.	They are more likely to break from hail and other environmental conditions.  They are so efficient that they risk overheating and boiling dry in summer.  They are largely imported, evacuated-tube panels and so are becoming more expensive as the rand weakens.

*How to choose which type of collector you need:*

Your roof will help determine how you should heat water. If you have a roof that faces north – or at least between northeast and northwest – and gets full sun, flat panels are the most trouble-free option and will provide most of your hot water needs. If your roof gets limited sun, evacuated tubes may be necessary to provide enough hot water. And if your roof gets very little or no sun, you will be best advised to purchase a heat pump instead.

**Direct vs Indirect systems**

There are two main types of systems, corresponding with the two types of collectors:

Direct systems	Indirect systems
Also called open-circuit systems.  These circulate water directly between the storage container and the collector(s), so the water you use in your shower is the same water that has been heated in the collector. A direct system should only be used under certain conditions, for example, in areas where temperature never drops below freezing and where the quality of the water supply is suitable.	Also called closed-circuit systems.  These have heat transfer fluid that circulates through the collectors via a heat exchanger that transfers heat from the collector circuit to the water in the storage container. Indirect systems are essential in areas that are exposed to frost or freezing because they are resistant to the cold. They are also used where the water is hard, as the system avoids lime scale build-up in the collectors. Indirect systems can require additional maintenance, as the heat

	<p>transfer fluid must be checked and might need to be topped up.</p> <p>These systems typically use evacuated tubes.</p>
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In Cape Town, there is no risk from freezing and hard water is very uncommon, so direct systems are well-suited for local needs.

**Installation methods: Close coupled or split systems**

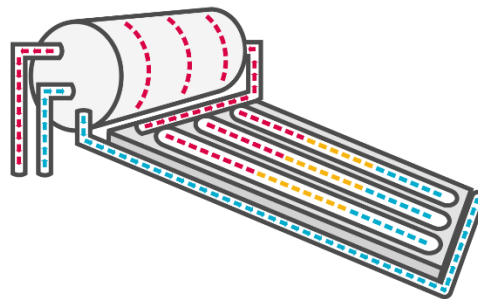
This refers to where the storage tank is situated in relation to your collector, and determines if you need an electric pump to circulate the water between the two or not.

*Close-coupled system*

This is the most common and least- expensive position for the tank. The storage tank is positioned just above the panels, lying horizontally.

The main advantage of close-coupled solar geysers is that they require no electricity or moving parts to circulate. This circulation is called the thermosiphon effect.

These solar geysers have fewer parts to possibly fail over time and need less maintenance. They even work when the electricity fails.



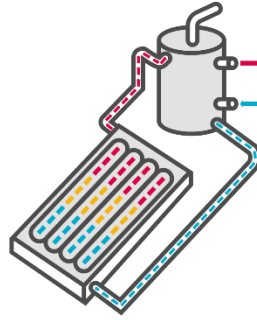
*Split system*

Here, the panels, or the collector, are on the roof, but the tank is inside the roof (typically in a vertical orientation).

These installations are more customised and more expensive, but can make moderate improvements in efficiency compared to a close-coupled system. A tank exposed to the outside air will lose more heat at night than a tank indoors, and a vertical tank will retain more heat than a horizontal tank

This positioning often uses a small pump to circulate the heat from the panels to a tank or tanks located close to bathrooms and the kitchen – meaning they require electricity to work

Split systems are commonly used when the aesthetics of having a visible or exposed tank are a concern.



## High pressure vs low pressure solar water heaters

Low pressure solar water heaters provide gravity-fed hot water pressure only, and typically do not have a backup electrical heating element.

High pressure solar water heaters provide hot water at pressures commonly found in homes and businesses, and have backup electrical heating elements to provide hot water when solar radiation is too low or at night.

## Technical information

### What size tank/system should I have for my home/household size?

Installing the correct size of system is key. You should be able to store enough hot water to get your household through most 24-hour days' worth of need, and also through a cloudy day. The general rule is a minimum of 50 litres of tank storage per person, plus another 50 for the house.

If you need more than 300 litres of hot water per day discuss with your installer the option of splitting the total into two tanks, with water flowing from one tank to the next, in series. That way, when you use water, it is replaced by heated water from the supply tank, not by cold water. And if you need to heat the water electrically before your morning shower, you only heat a smaller tank. A less expensive – and somewhat less efficient – variation of this idea uses an existing geyser, supplied with hot water from a solar tank. This is called a pre-feed system

### Should I put a timer on the electrical backup, and why?

Yes, you should have a timer for the electrical backup of your solar water heater.

A solar water heater should eliminate most – but not all – of your electricity use for water heating. However, an electrical back-up element in the tank is standard for most high- pressure systems. In the summer, electrical back-up may not be needed at all, and you may choose to switch off the electricity to the geyser at the DB board.

But with cloudy weather or a weak winter sun, extra heat will be needed to bring the warmed water up to a hot enough temperature. The key to saving energy is to avoid heating the water with electricity just before the sun gets to work. Therefore, every solar water heater should have a timer on the electrical backup.

## What times should the electrical backup be set for, and why?

The timer on electrical backup of your solar water heater should keep electricity to the heating element off during the peak daylight hours of sunshine, switching it on if needed at about 4pm for an hour.

This is if you use a lot of hot water during the day or if it is cloudy. If your family is in the habit of showering and bathing at night, you can save the most by keeping the electricity off until just before its needed again. If morning showers require extra hot water, experiment with a short 1-2 hour boost at 3 to 5am, shutting off by 6am for the rest of the morning.

A thermostat timer allows the extra control of setting different temperatures for different times of the day.

## What is the ideal temperature to set the geyser to?

60 degrees Celsius is generally the best temperature, but many can get away with 55°C especially in summer months. Don't go below 55°C because of the risk of bacteria growth.

More than 60°C is usually not a good option as your backup element on the solar water heater will be heating the water too much and using more electricity than you need (costing you more). Typically, a 10°C reduction results in saving 5% on your hot water electricity bill.

## How long does the electrical backup need to get the water in the geyser back to the targeted temperature again?

One hour is a good rule of thumb, but this will vary by the size of the tank, how cool the water was, the model and age of the heating element and other factors.

## Does a remote thermostat control work? Is it recommended?

A remote thermostat control may be a good option for you, if you are testing whether 55°C or 60 °C works best for your household, or adjusting the temperature often, or have other reasons for changing the thermostat for your hot water, and you need to climb onto your roof or into your attic to do so.

Note that this function (i.e. thermostat or temperature control) is different from what a timer will do (i.e. turning the electricity to the unit off and on), and some remote thermostat controls also include a timer.

What a remote thermostat control can also do, depending on where it is placed and who sees it, is raise awareness in the household of hot water heating and energy conservation issues, leading to behaviours that result in using less hot water.

## Will I have to change my bathing or showering habits?

No, but you'll save more if you bath or shower at night to take advantage of the water heated up during the day.

## What kind of maintenance is needed for my solar water heater?

Maintenance for solar water heaters varies by type and installation. Generally speaking, the more complex installations with more moving parts require more maintenance to keep performance up.

Generally speaking it's a good idea to have your Service Provider check out your solar water heater once a year or so.

Solar collectors must be clean to be effective. Generally, these can be cleaned as part of the annual maintenance. However, if you live in a very dusty area, an area subject to dust or sandstorms, or where coastal build-up of salt deposits from the ocean can be a problem, the glass panels of the collectors should be washed with clean water at least once every three months in winter and once a month during the remainder of the year.

Evacuated tube systems may require re-evacuation a few times during their expected life. Please consult your supplier for maintenance requirements.

Indirect systems need replacement of the transfer fluid every 4 to 5 years.

Your hot water storage tank has a 'sacrificial anode' in it, which helps prolong the life of the tank. This may need to be replaced every few years, but will vary by household.

## Will my solar water heater be affected by water supply issues?

High pressure solar water heaters (ie. with a pressurised tank), whether they are flat-plate collectors or evacuated tubes are not at risk of damage from low water pressure or short periods of no pressure (water outages). Please see this advisory by the City for Cape Town for more information.

## What are the water heating requirements required by the new SANS 10400-XA?

SANS 10400-XA requires that at least 50 % (volume fraction) of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating including but not limited to solar heating, heat pumps, heat recovery from other systems or processes and renewable combustible fuel. [Read our guidelines to understand the SANS 10400-XA energy efficiency requirements for buildings.](#)