



Step-by-step guide to solar hot water

Solar water heaters come in so many configurations that the decisions facing a solar shopper may seem daunting. This guide is designed to make those decisions easier.

Decision 1: Choose an installer

When solar systems do not perform as expected, poor-quality installation is usually the reason, so this is your most important decision. Look for an installer who belongs to the Sustainable Energy Society of Southern Africa (SESSA). This gives you access to their ombudsman, should anything go wrong. Preferably go for installers with experience. Ask for references or use an installer recommended by someone you know. And get more than one quote.

The municipal governments of both Cape Town and Durban (eThekweni) have accredited a limited number of preferred installers. Click the following links to find the list of installers for [Cape Town](#) and for [eThekweni](#).

Your installer will help you through the rest, but you will want enough background to make informed decisions. So read on . . .

Decision 2. Flat panel or evacuated tubes? (. . . or heat pump)

The panels that absorb sunlight to heat water come in two basic forms: flat panels and evacuated tubes. **Flat panels** have a single large pane of glass over a collector lined with metal pipes to collect the sun's heat. **Evacuated tube** panels are made of rows of long glass tubes. In each glass cylinder, the heat is absorbed by a pipe, which is insulated from the colder outside air by an insulating vacuum, a bit like a vacuum flask.

Evacuated tubes generally create more hot water, especially when the sun is weak and the weather is cold, but they have three important disadvantages. One is that they are more likely to break from large hailstones. The second is that because they are so efficient, they risk overheating in summer. Finally, because they are largely imported, evacuated-tube panels are becoming more expensive as the rand weakens and Eskom eliminates the solar rebate for imported collectors and tanks.

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 need a heat pump or gas water heaters.

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Decision 3: Direct or Indirect?

Some panels heat water directly, which is called a **direct** system. But many heat a glycol solution so that panels don't freeze on cold nights. The glycol solution heated in a flat panel flows through a coiled pipe inside the solar tank to heat the water. (The glycol and water never come in contact.) This is called an **indirect** system. With indirect evacuated tubes, the fluid is sealed within each tube and heats the water at the top of the tube, where it is inserted into a water pipe or tank.

Direct systems are less expensive and more efficient, so if you live in a frost-free zone, they are a great option. The one exception is if your water has a high mineral content. (Does your kettle collect a thick layer of scale?) If your home is in an area that gets winter frost regularly, an indirect system is the safer option.

Decision 4: How much water storage?

You want to store enough hot water to get you through most evenings and maybe even a cloudy day. The general rule is a minimum of 50 litres of tank storage per person, plus another 50 for the house. So a family of four needs 200l + 50l for a total of 250l. Eskom rebates increase for larger solar water heaters, so choosing a bigger system does not have to cost much more.

If you need 300l or more, 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.

But be careful of using an old geyser as the only tank on a solar system – called a **retrofit**. A tank designed specifically for solar is best for maximum efficiency and minimum hassle. (Heat pumps, however, often can make use of an existing geyser.)

Decision 5: Close-coupled or split?

The most common and least-expensive position for the tank is just above the panels, lying horizontally. This is called a **close-coupled** system. The main advantage of close-coupled solar geysers is that they require no electricity or moving parts to circulate. The glycol or water in the panels rises naturally when it is hot and sinks when it is cooler. 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.

In a **split** system, the panels are on the roof, but the tank is not. These installations are more customized and more expensive, but can make moderate improvements in efficiency compared to a close-coupled system. A horizontal 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. It is still possible to take advantage of the thermosiphon effect if there is space in the roof for a tank located well above the panels, but the most efficient system will use a small pump to circulate the heat from the panels to a tank or tanks located close to bathrooms and the kitchen. To eliminate the problem of electricity outages, some systems even use a solar-powered pump.

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Decision 6: A timer

A solar water heater should eliminate most – but not all – of your electricity use for water heating. An electrical back-up element in the tank is standard. 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.

The timer should keep electricity to the geyser off during the peak daylight hours, switching it on if needed at about 4 pm for a couple of hours. If your family is in the habit of showering and bathing at night, you can save the most by keeping the electricity off until the next afternoon. If morning showers require extra hot water, experiment with a short boost at 4 or 5am, shutting off by 6am for the rest of the morning. A thermostat timer like the Geysewise allows the extra control of setting different temperatures for different times of the day.

Decision 7: A roof bracket

Your roof may be pitched at too low a slope to take the best advantage of the winter sun. Many people prefer the look of panels flat against the roof, but for maximum efficiency, your installer should be able to tell you the ideal angle for panels at your latitude. (36 degrees in Johannesburg and 44 degrees in Cape Town) If your roof has too low a pitch, consider paying for a brackets to support the panels to the ideal angle, which will increase winter heat gain by about 10 to 20 percent.

Decision 8: What to pay and how to pay

The table below gives an approximate range of prices and rebates for Eskom authorized systems. Some installers will subtract the rebate from the price due on installation.

Litres	Installed price	Eskom rebate	Net cost
150	17 500 – 26 000	4 500 – 6 000	13 000 – 20 000
200	19 000 – 28 500	5 000 – 6 500	14 000 – 22 000
300	28 000 – 40 000	9 000 – 11 000	19 000 – 29 000

These price ranges are for ordinary close-coupled, direct and indirect systems, installed. Customized systems will cost more.

If your lowest quote is much lower than this range, look closely at the product and the installer. Be sure they're offering a quality product with a track record in South Africa and the SABS mark on all components. Ask about warranties, service fees and maintenance intervals. Check if the installation will comply with SANS 10106 and SANS 10142 national standards for solar installations, and whether you will receive electrical and plumbing certificates of compliance. Even if it costs a bit more up front, you'll have confidence that the product and the installation were of a high standard. The adage that "you get what you pay for" applies to solar installations too.

If you do not have the cash on hand to pay upfront for solar, don't give up. Many installers can help arrange financing. Banks allow homeowners to use their access bond to pay for a solar water heater at a rate that is more affordable than other, unsecured loans for solar. If the terms of your loan are attractive, the savings on your utility bill should cover the principal and interest payments. Some installers even offer the option to rent your solar water heater.

Whatever small decisions you make, if you've made the one big decision – to heat your water a better way – your bank balance, the air and the climate will all benefit in the long run.