Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

ILLUMINA
THE POWER OF THE SUN

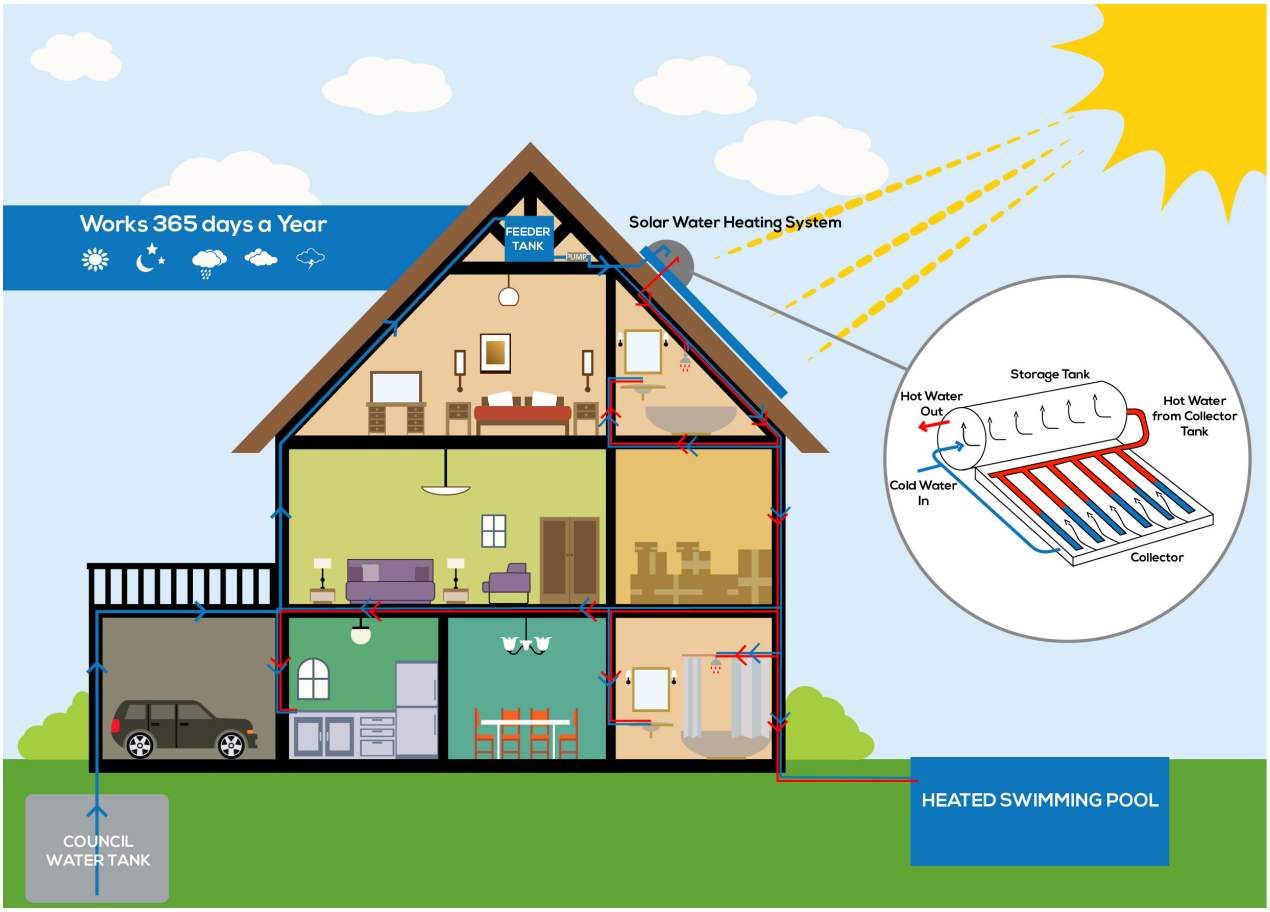
ERC certified Solar Water Heating Contractor- ERC/SWHC/00080

Solar Water Heating Literature

To Whom It May Concern,

Thank you for your interest in considering Illumina Africa Limited for your solar water heating requirements. We are a company dedicated to providing the greatest quality coupled with the best customer satisfaction and energy independence, while optimizing the design for reduced cost and increase rate of return. We work with certified solar water heating technicians with decades of experience making your change to solar easy. Our solutions are custom designed specifically for you in order to really improve the way cost-effective electricity and hot water is delivered in residential and commercial applications.

Below is an example diagram of how a system might work and how water flows in and out of the system:



Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

Investment in solar not only protects our environment, but also to saves money in the long run. Utilizing solar water heating and solar electric (PV) systems is a popular way of lowering your energy bills while also reducing your carbon footprint.

Sizing

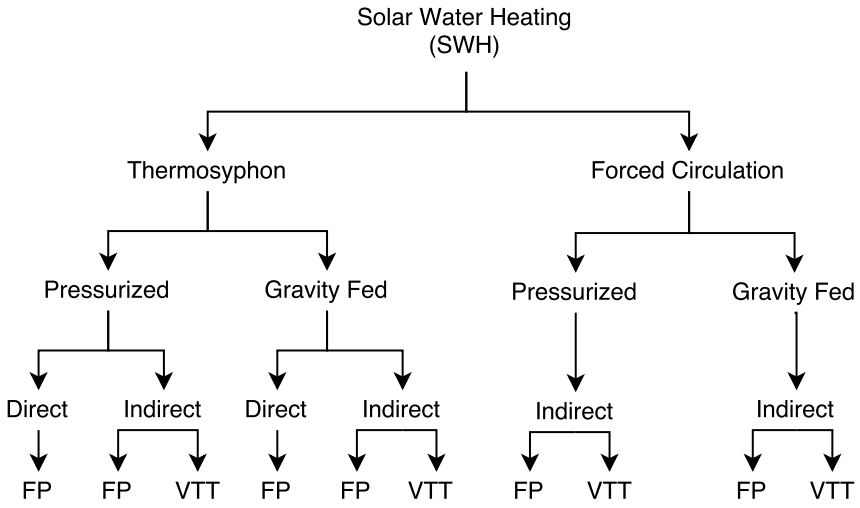
Recommended minimum of: 50 liters per person or 1.5*number of rooms*30L (to comply with the regulation).

Illumina Africa Ltd. recommends a minimum of 100 liters per person for maximum solar hot water enjoyment and return on investment. Kitchens: We do recommend NOT connecting the solar collectors to the kitchen taps. If supply of hot water to the kitchen is required, we then recommend an additional system to serve the kitchen only.

In general, gravity fed systems require no pump (where feeder tanks are above solar tanks) otherwise a pressurized system is required.

Solar Water Heating Technologies

Solar Water Heating Systems can be split up into different categories as described by the flow chart below;



Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

ILLUMINA
THE POWER OF THE SUN

Thermosyphon or Forced Circulation?

Thermosyphon: The water is heated passively by solar energy and relies on heat energy being transferred from the sun to a solar collector. The heat from the collector is transferred to the water in two ways: directly where water circulates through the collector, or indirectly where an anti-freeze solution carries the heat from the collector and transfers it to water in the tank via a heat exchanger. Convection allows for the movement of the heated liquid out of the solar collector and be replaced by colder liquid. Due to this principle, the solar water tank needs to be above the collector.	**Forced Circulation:** A recirculation pump is required to circulate the heat transfer medium (usually a glycol water mixture) between the collector and tank. The tank can be installed anywhere, usually where a traditional electric geyser would be placed leading to aesthetic benefits. Only the panels need to be on the roof.
✓ Simple systems ✓ Robust and cost effective ✓ No need of a recirculating pump (Note: pressurized systems require a pump)	✓ High performance and reliability ✓ Aesthetically appealing
× Tank needs to be located above the collector resulting in a cold run. Roof reinforcement might be required. × Horizontal tank is not good to have stratification of water. × Not suitable for colder climates	× Expensive × Glycol requires regular servicing and replacement. × Additional expansion vessels are required since glycol can easily vaporize

Pressurized or Gravity Fed?

Pressurized: If the feeder tank (storage tank on roof or attic) is below the solar water heating tank, then a pump is required to pump water from the feeder tank to the solar tank.	**Gravity Fed:** If the feeder tank (storage tank on roof or attic) is above (either it's raised or was always above) the solar water heating tank, then gravity can be used to fill the solar water heating tank.

Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

ILLUMINA
THE POWER OF THE SUN

Direct or Indirect?

Direct Systems: The water itself is circulated through the solar collector when the water need to be heated.	**Indirect systems:** Instead of water being recirculated, a heating fluid (a mixture of glycol and distilled water) is circulated through the solar collectors and then through the water tank, where the water is heated
✓ Cost effective ✓ Longer lifetime ✓ Simple system ✓ Suitable for soft water (Note: Nairobi council water is suitable but bore well (ground) water is not.)	✓ Suitable for use where the water is hard or salty ✓ Used during the winter period as the glycol does not freeze whereas the water would
× Not suitable for cold climates × Not suitable for hard and salty water	× More expensive × Glycol requires regular servicing and replacement. × Additional expansion vessels are required since glycol can easily vaporize

Flat Plate vs Vacuum Tube (VTT/ET)?

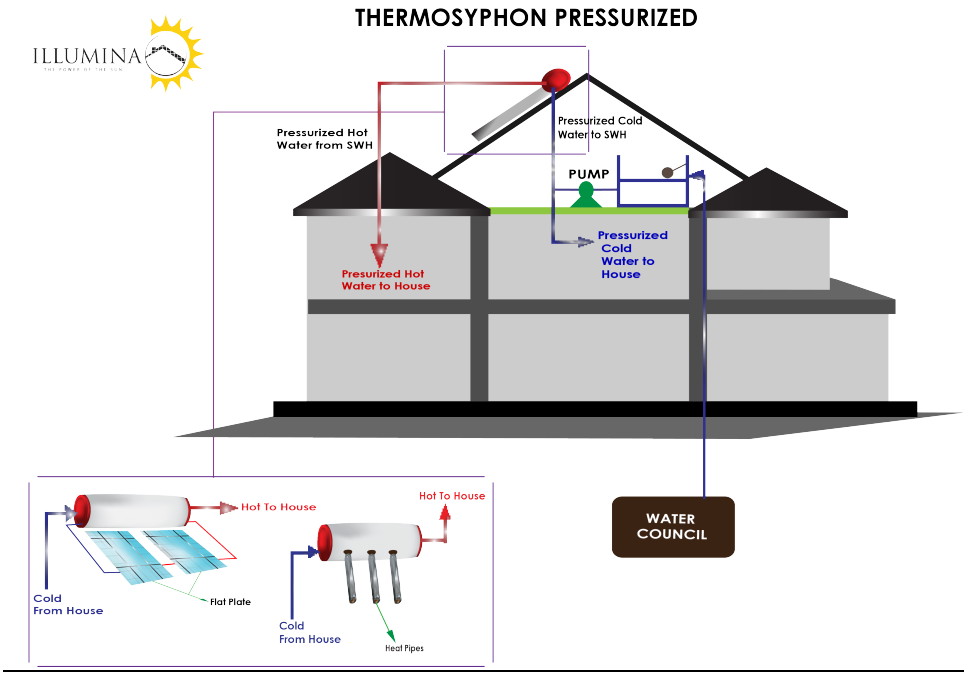
Flat Plate: collectors are an extension of the idea to place a collector in an oven like box with glass directly facing the sun. The heating liquid flows in the plate and is heated by the sun.	**Vacuum Tube:** collectors are two concentric pipes with a vacuum in the middle. Water can either flow into the pipe to be heated directly or a copper heat pipe is used to heating the water in the tank indirectly.
✓ Cost effective ✓ Simpler design ✓ Longer warranties and lifetime ✓ Less fragile ✓ Low risk of overheating, perfect for domestic water heating use. ✓ In warmer climates (e.g. Kenya), they are more efficient.	✓ Easy to install ✓ Lighter ✓ Used in colder climates because more efficient in cold climates ✓ Retains heat better due to the vacuum
× Heavier and take up more space × Cumbersome to install	× More Expensive × Shorter warranties × Prone to overheating (a thermostatic mixing valve is recommended). × Sealing and maintaining a vacuum is difficult and easily damaged.

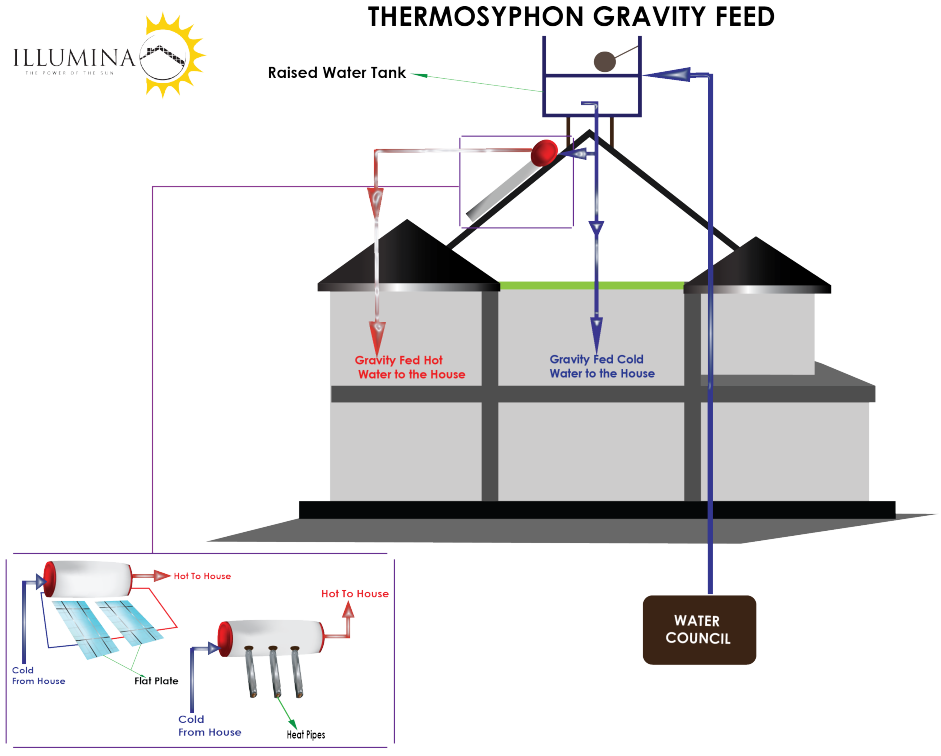
Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

ILLUMINA
THE POWER OF THE SUN

Schematic of some of our recommended systems





Address: Arbor Place, 904 James Gichuru Rd, Lavington, Nairobi

Email: info@illuminaafrica.com

Illumina recommends a thermosyphon for old and already built houses due to ease of installation. The schematics show how the hot and cold water flows in the house for thermosyphon systems.

In hot countries such as Kenya, we recommend a flat plate system. They are simpler designs, longer warranties, cheaper and actually more efficient in warmer climates.

If council water is being used, we recommend a direct flat plate system but an indirect VTT and flat plate can be used too but result in higher equipment costs. If borehole water is being used, or in areas with salty water, we recommend an indirect system (either indirect flat plate or indirect VTT).

All our systems include a temperature & pressure relief valve to release excess steam and pressure build up in the tanks. In addition, if a pressurized system is installed, we make sure the cold-water supply is also pressurized, for ease of mixing water.

Our process

Illumina will always carry out a free site survey before providing you with a custom system design and quote, and will always include in the quote all the necessary accessories that you require i.e. booster pumps, expansion vessel, extra plumbing works, solar temperature controller. We do not want to go back to the client asking for additional payments (termed as cost over-runs).

When pressurization is required, we use a specific booster pump that operates at no more than 2.5 bars while also installing a pressure automator to control pressure changes. This pump can be silent (more expensive but recommended for residences where silence is beneficial) or the normal booster pump (recommended for apartments)

Our systems are fully automated, unless clients state otherwise. We fully automate the booster pump to only turn on when a tap is opened. And the electric booster element is automated to ensure you always have hot water even during the rainiest/cloudiest of days.

Your home insurance should cover any possible damage not relating to manufacturing or workmanship defects that may occur during the lifetime of your system (expected at 15-20 years).

Illumina engineers precise designs to the highest of standards available with today's technology.

Yours truly,

The Illumina Africa team.