

Consumer guidelines

- 1) Always buy products from reputed manufacturers only.
- 2) Insist on authenticated test certificates before buying a solar water heater.
- 3) Make sure that a learned sales person visits your installation site to understand your requirements in detail. He should study the site conditions in detail to avoid unnecessary modifications at a later stage.
- 4) Make sure that the correct size of the SWH is installed in the correct inclination, to expose it to the maximum sunlight and that the plumbing pipes are insulated to avoid heat loss.
- 5) If your's is a family of 4 persons (2 adults and 2 children), a 100 LPD SWH is sufficient, as a thumb rule.
- 6) Make sure that the plumbing is done correctly and engage only an experienced plumber who is an expert in SWH plumbing.
- 7) Always insist on the installation and trouble-shooting manual, including the warranty card.
- 8) Understand the various incentives available on SWH purchase before finalizing the price. Check if the utility company provides any tariff incentive on an SWH.
- 9) An SWH can be installed efficiently without compromising the aesthetics of your building. Consult a knowledgeable architect before deciding on the installation of an SWH, if required.

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Solar water heating systems for residential applications

Solar energy has been used most widely for water heating in many countries.

Solar thermal technologies hold significant promise for India, for fairly good solar insulation of 4 - 6.5 kWh/sq.m /day with an average of 280 clear days, as well as relative maturity of

technology. Yet, against an estimated potential of 140 million sq. km. of collector area, India has installed only a little over 1.5 million sq. km. of collector area till date.

However, the Ministry of New and

Renewable Energy (MNRE) understands the importance of solar water heating systems for various applications, and significant efforts have been made towards the development and dissemination of the same.

Importance of solar water heating systems

- Minimum utilization of fossil fuel for heating purposes, and associated environmental impact.
- Minimum utilization of conventional energy during peak demand, which thus contributes to reduction in peak power shortage.
- Emerging of a new market with sustainable economic development and employment generation.

Benefits to the customer and society

- Reduced electricity bill with a return on capital investment in approximately 4 to 5 years.
- Peak demand reduction and

avoidance of costly power purchase. (Hot water is typically used for bath, during peak hours in India.)

- Almost zero maintenance cost with a life span of 15 to 20 years.
- Reduced carbon emission and fulfilling renewable obligation.

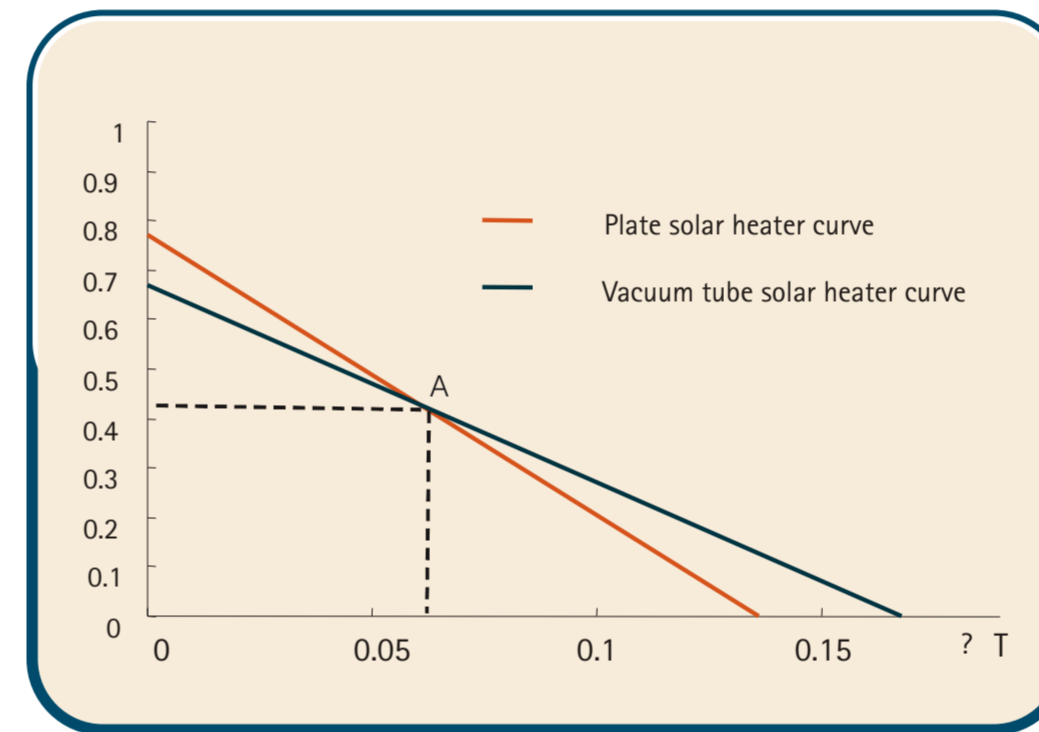
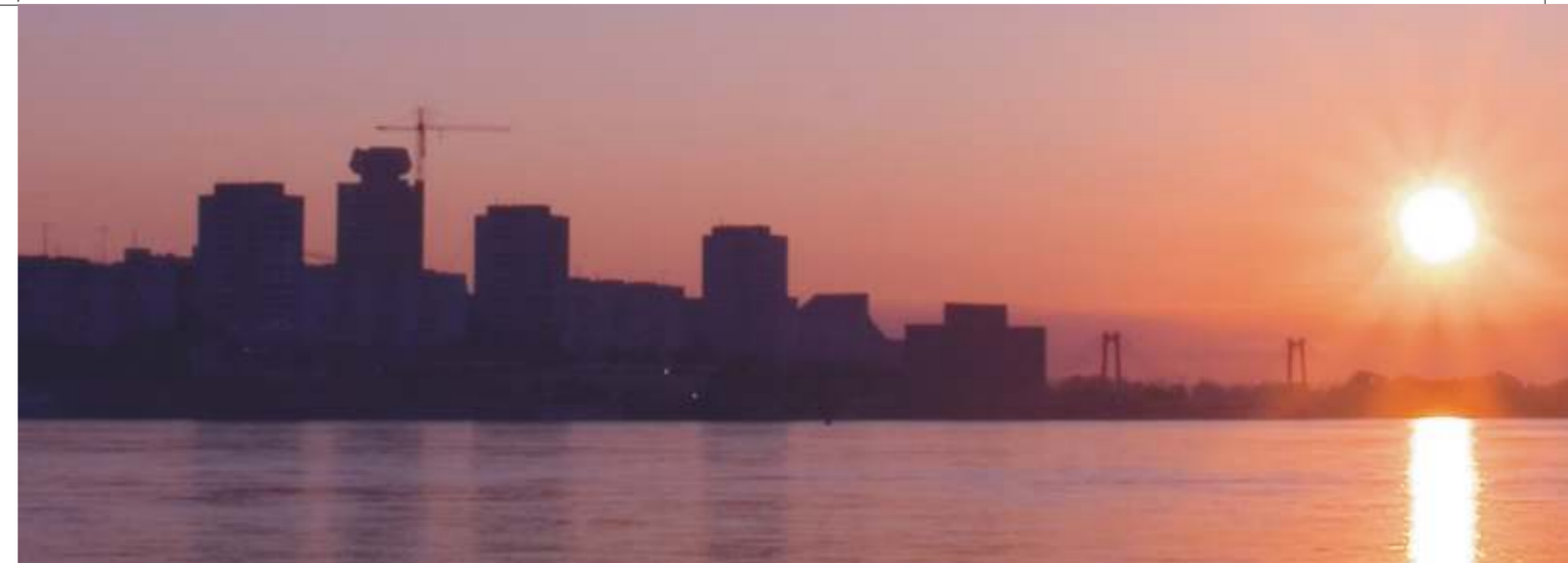
Which solar water heater (SWH)

It is inaccurate to generalize which types of solar collectors boast higher efficiency. SWH are different in efficiency under different operating conditions. The figure on the next page shows the comparison of the heat collection efficiency of flat plate and vacuum tube SWH. At the A point, the two solar collectors have equal efficiency. When the temperature

difference is small between the working medium and the environment, plate solar collectors have higher efficiency than vacuum solar collectors. But, when the temperature difference between the working medium and the outside is big, plate solar collectors have lower efficiency than vacuum solar collectors.

$$\Delta T = (T_i - T_a) / G$$

The difference in temperature is given by the formula above, where T_i means temperature of working medium inside solar collectors and T_a means outdoor air temperatures. G means the sun's radiation.



Note: The vertical coordinate stands for solar collector efficiency and the horizontal coordinate means temperature difference ratio.

The specific costs of the collector are also important. Flat collectors demonstrate a good price-performance ratio, as well as a broad range of mounting possibilities (on the roof, in the roof itself, or unattached). Evacuated-tube collectors are substantially more expensive than flat-plate collectors.

Electricity savings and Payback Calculations



Electricity savings and payback calculations

Description	Domestic application calculation
To heat 100 litres of water from 20° to 60°	$(100 \times 1 \times (60 - 20)) / 861 \times 0.9$ per day
Electricity required	5.2 units per day
Electricity savings per month for 100 LPD	$5.2 \times 30 = 156$ units
Electricity savings in Mumbai for 100 LPD (considering 8 months of hot water requirements)	$156 \times 8 = 1,248$ units
Savings per year for 100 LPD (considering electricity cost = Rs. 5/- per unit)	$1248 \times 5 = 6,240$
Cost of 100 LPD flat plate SWHs	20,000
Payback period	$20,000 / 6,240 = 3.2$ years

Note: By installing a solar water heater, electricity rates will change to a lower slab. Connected load will also decrease correspondingly.