RimLife Green Technologies

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Solar Water Heater Fact Sheet

Department of Energy, USA (DOE)

Energy-Efficient Water Heating

To lower your water heating bills, try one or more of these energy-saving strategies:

- Reduce your hot water use
- Lower your water heating temperature
- Insulate your water heater tank
- Insulate hot water pipes
- Install heat traps on a water heater tank
- Install a timer and use off-peak power for an electric water heater
- Install a drain-water heat recovery system.

If you haven't already, you can save energy and money by installing a new, more energy-efficient water heater in your home.

Also, see how to read residential electric and natural gas meters to help you monitor your efficiency efforts.

Estimating a Solar Water Heater System's Cost

Before purchasing a solar water heating system, you can estimate its annual operating cost and compare it with other more and/or less efficient systems. This will help you determine the energy savings and payback period of investing in a more energy-efficient system, which will probably have a higher purchase price.

Before you can choose and compare the costs of various systems, you need to know the system size required for your home.

Calculating Annual Operating Cost

To estimate the annual operating cost of a solar water heating system, you need the following:

- The system's solar energy factor (SEF)
- The auxiliary tank fuel type (gas or electric) and costs (your local utility can provide current rates).

Then, use the following calculations.

With a gas auxiliary tank system:

You need to know the unit cost of fuel by Btu (British thermal unit) or therm. (1 therm = 100,000 Btu)

365 × 41,045/SEF × Fuel Cost (Btu) = estimated annual cost of operation

OR

365 × 0.4105/SEF × Fuel Cost (therm) = estimated annual operating cost

Example: Assuming the SEF is 1.1 and the gas costs $1.10/therm

365 × 0.4105/1.1 × $1.10 = $149.83

With an electric auxiliary tank system:

You need to know or convert the unit cost of electricity by kilowatt-hour (kWh).

365 × 12.03/SEF × Electricity Cost (kWh)= estimated annual operating cost

Example: Assuming the SEF is 2.0 and the electricity costs $0.08/kWh

365 X 12.03/2.0 X $0.08 = $175.64

Comparing Costs and Determining Payback

Once you know the purchase and annual operating costs of the solar water heating systems you want to compare, you can find the costs associated with conventional water heating systems and compare the two.

Use the table and calculations below to compare two solar water heating systems and determine the cost savings and payback of the more energy-efficient system model.

System Models	System Price	SEF	Estimated Annual Operating Cost
System Model A			
System Model B (higher SEF)			
Additional cost of more efficient system model (Model B)			Price of System Model B - Price of System Model A = $Additional Cost of Model B
Estimated annual operating cost savings (System Model B)			System Model B Annual Operating Cost - System Model A Annual Operating Cost = $Model B's Cost Savings Per Year
Payback period for Model B			$Additional Cost of Model B/$Model B's Cost Savings Per Year = Payback period/years

Example:

Comparison of two solar water heating system models with electric backup systems and electricity costs of $0.08/kWh.

System Models	System Price	SEF	Estimated Annual Operating Cost
System Model A	$1,060	2.0	$176
System Model B	$1,145	2.9	$121
Additional cost of more efficient model (Model B)			$1,145-$1,060 = $85
Estimated annual operating cost savings (Model B)			$176-$120 = $56 per year
Payback period for Model B			$85/$56 per year = 1.5 years

Other Costs

When comparing solar water heating systems, you should also consider installation and maintenance costs. Some systems might cost more to install and maintain.

Consult the manufacturer(s) and a qualified contractor to help estimate these costs. These costs will vary among system types and sometimes even from model to model.

The Economics of a Solar Water Heater

Solar water heating systems usually cost more to purchase and install than conventional water heating systems. However, a solar water heater can usually save you money in the long run.

How much money you save depends on the following:

- The amount of hot water you use
- Your system's performance
- Your geographic location and solar resource
- Available financing and incentives
- The cost of conventional fuels (natural gas, oil, and electricity)
- The cost of the fuel you use for your backup water heating system, if you have one.

On average, if you install a solar water heater, your water heating bills should drop 50%–80%. Also, because the sun is free, you're protected from future fuel shortages and price hikes.

If you're building a new home or refinancing, the economics are even more attractive. Including the price of a solar water heater in a new 30-year mortgage usually amounts to between $13 and $20 per month. The federal income tax deduction for mortgage interest attributable to the solar system reduces that by about $3–$5 per month. So if your fuel savings are more than $15 per month, the solar investment is profitable immediately. On a monthly basis, you're saving more than you're paying.