E³A: Solar Hot Water Applications for the Home, Farm or Ranch

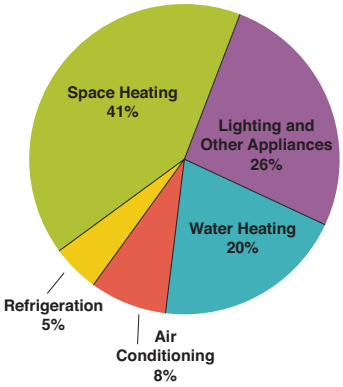
Steps in the Solar Hot Water Series

Introduction

In the United States, water is typically heated using natural gas, electricity generated from coal, natural gas or hydroelectric power, or propane. Water heating can account for up to 20 percent of a home's total utility bill. Agricultural buildings and processes can use large amounts of heated water. For some dairy farms, water heating can account for 25 percent of the total energy used.

Rather than use fossil fuels, one alternative is to use the sun's energy. Solar hot water systems capture the sun's energy to heat water. Solar hot water systems are also called solar thermal water systems or solar domestic hot water systems.

How Energy Is Used In Homes (2005)



Source: U.S. Energy Information Administration, *Residential Energy Consumption Survey 2005.*

How do solar hot water systems work?

A south-facing collector absorbs the sun's energy to heat a fluid such as water or antifreeze. In Missouri, solar domestic systems typically have a fluid transfer its heat to potable water stored in a tank.

Some areas are sunnier than others, but all counties in Missouri receive enough sun to make a solar hot water system feasible. Even in temperate climates, these systems can provide up to 80 percent of hot water needed. The rest can be provided by an on-demand tankless water heater or a conventional storage tank system.

Benefits

Today's solar hot water systems are reliable, efficient, adaptable and affordable. The purchase and installation cost of a residential solar hot water system can range from $4,000 to $10,000. When considering the second price tag, or operating costs, solar hot water systems can be especially cost effective compared to electric and propane water heaters. Considering that a properly designed and installed system can last up to 40 years, you can get a lot of value out of a system. Average water heating bills often drop 50 to 80 percent, so systems can quickly pay for themselves. Payback time decreases when fuel costs increase, and government and utility tax incentives and rebates can significantly reduce the final system cost.

Solar hot water systems can be used for radiant floor heating and indoor and outdoor swimming pools, but these guides only address agricultural buildings and processes and residential systems used to heat water for bathroom and kitchen fixtures and appliances.

Process

Use these guides to determine whether a solar hot water system will work for you. They will help you discuss solar hot water systems with a company or installer. These guides can be used separately or together for a step-by-step decision-making process.

1. **Building and Site Assessment:** Missouri has ample sun for solar hot water systems, but there are other building and site conditions to be considered.
2. **Conservation and Efficiency:** Conserving and using water and energy efficiently allows for a smaller, more efficient and affordable system.
3. **System Options:** For Missouri's cold winters, there are several systems that work well and do not freeze.
4. **System Sizing:** Proper sizing is important for an efficient and cost-effective system.
5. **Costs:** Installation, operation and maintenance costs depend on several factors. Rebates and incentives lower the final purchase and installation cost.
6. **Installation:** Considerations for a do-it-yourself install or hiring a contractor.
7. **Operation and Maintenance:** Routine inspections and maintenance will result in efficient and long-lived systems.
8. **Solar Hot Water Collector Sizing Worksheet**

References

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