

In-Depth: *Solar Thermal for Domestic Hot Water*



Cascade Meadow
Wetlands & Environmental Science Center

Function

The Cascade Meadow center and site feature several renewable energy systems. In partnership with Rochester Public Utilities, these renewable systems support one of our major goals- to demonstrate a range of market-ready renewable energy technologies. The solar thermal system was purchased, installed, and is maintained by Cascade Meadow.

Could solar thermal work for you?

Solar thermal systems are exciting for people for many different reasons. Are you most excited by the reduced environmental impact? Do you favor energy independence? Do you want to save money with your system? Many people are excited about the potential of solar thermal systems to supply nearly all of the hot water needs for a home or business at a very low operating cost. Your particular motivation will impact your selection of equipment, its installation and operation, and the overall economics of your project.

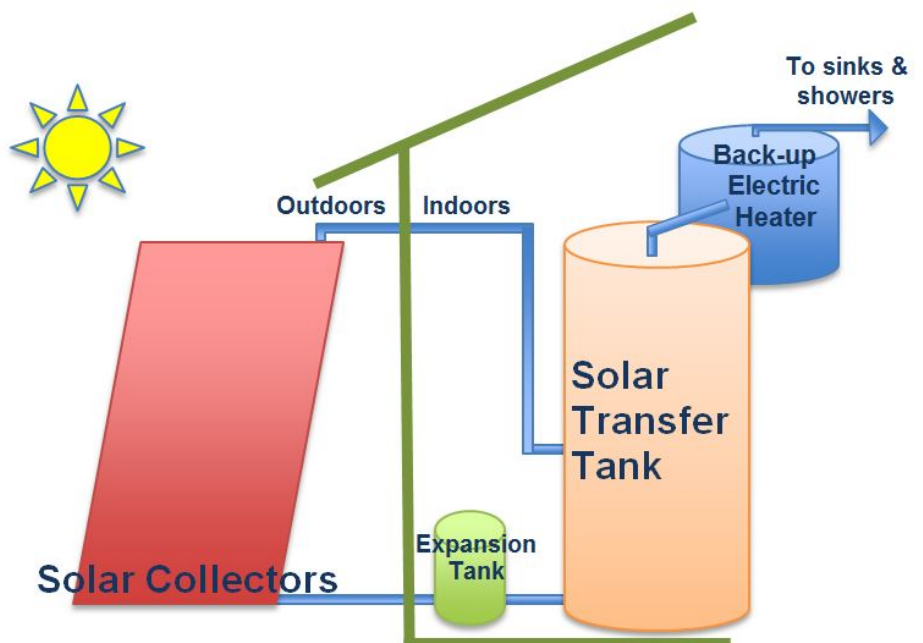
Address efficiency first!

Before you decide on the size of your solar thermal system, work to reduce your overall hot water needs by replacing old, inefficient faucets and installing water-efficient appliances. Reducing and making your hot water use more efficient first will enable you to choose the right size for your solar thermal system and possibly save significant equipment, installation, and maintenance costs.



Solar thermal systems for domestic hot water are generally recognized for their ability to save considerable amounts of energy associated with heating water for a home or business. This sheet provides details for the solar thermal system at Cascade Meadow and answers some of the typical questions that arise when considering the purchase of a solar thermal hot water system.

What are the typical parts of a solar thermal system?





Our solar thermal system

Cascade Meadow features a solar thermal system with three main parts:

- **Two solar thermal panels** or “collectors” outside that collect heat from the sun: A non-toxic anti-freeze liquid flows through specially-designed copper pipes and is pumped into the building.
- A **solar transfer tank** that transfers the solar heat from the anti-freeze solution to fresh water.
- A **back-up electric water heater** (can also use natural gas or liquid propane) that gets used on days when weather conditions (i.e. cloudiness and cold) mean that there isn’t enough hot water to meet demand.

	Manufacturer and model	Capacity/Size
Solar Collectors (2)	Solar Skies® SS-40	Transparent Surface Area = 37.5ft ²
Solar Transfer Tank	Eagle Sun Systems® Thermo-Miser	80 gallons
Back-up Electric Water Heater	AO Smith® DEN 30	30 gallons

Conduct a feasibility study

Solar thermal systems can’t work for everyone or every site. The process of deciding if solar thermal will work for you is called a feasibility study. Read the details below to learn more about the process. For sites where solar thermal presents too many challenges, consider purchasing renewable power from your power utility, become an advocate for large-scale renewable energy projects, or look into another renewable energy system, such as solar-photovoltaic or small wind.

Use the following list as a place to start:

1. Explore your motivation: Why do you want a solar thermal system? Are there simpler or less-expensive ways to reach your energy goals?
2. Know your solar resource: Does your site have enough sun in a southern exposure to support a solar thermal system? Are there other practical or physical limitations at your site (limited structurally-sound space to support the panels, poor security)?
3. Investigate zoning/permitting: What local zoning or permitting rules (including ordinances) affect your site?
4. Choose your equipment: Based on the above three items, research the available solar collectors and other equipment that will meet your needs. Learn the differences between your choices for storage/transfer tanks, back-up water heaters, pumps, and other required equipment. Know the trade-offs for mounting on the ground vs. on a roof (roof-mounting can be more secure but involves working from heights).
5. Choose an installer: Contact others in your area that have used renewable installers and learn as much as you can. See more on this below.
6. Work with your utility: Know the applicable laws that affect you and your utility. Keep in mind that your utility has its own interests to consider.
7. Research insurance: While often overlooked, consider protecting your investment with insurance.
8. Count the cost of maintenance: Be aware of maintenance costs for fluids, tanks, pumps, and collectors.



What are the typical costs for a solar thermal system?

Solar thermal for domestic hot water costs typically range from \$7,000 to \$11,000 installed, not including federal, state, and local rebates and tax credits. A 2007 case study written for a solar thermal community project in Saint Paul, MN, provides some idea of the typical costs for a solar thermal system. In this case, the installer used a base price of \$6,000 for installation (which was \$1,500 less than typical), with 50% of the base price being for equipment, 40% for labor, and 10% for permits and other fees.

Additional costs detailed in the case study not included in the above figures included an average of \$500 in engineering assessments and anywhere from 0 to \$1,500 for structural upgrades. The case study was written by the Green Institute and MN Clean Energy Resource Teams and is available on the CERTS website (see additional resources below).

Additional resources

- To learn about solar thermal incentives and rebates:
 - For Rochester Public Utilities customers: If you have an electric water heater, RPU has a solar thermal rebate program as part of its “Conserve and Save” program. Visit www.rpu.org/your_home/power_services/solar_choice/Default.htm.
 - The state of Minnesota has a new “Made in Minnesota” solar rebate program. Find out more at mn.gov/commerce/energy/topics/resources/energy-legislation-initiatives/made-in-minnesota.
 - For a comprehensive and up-to-date list of federal, state, and local incentives and rebates, head to www.dsireusa.org.
- To find qualified local vendors, consultants, and installers:
 - The Minnesota Department of Commerce, Energy Division maintains a list of certified renewable energy installers at mn.gov/commerce/energy/businesses/renewable-energy/solar/solar-thermal/installation.
- To read solar thermal case studies and fact sheets:
 - Case Study: SE Como Neighborhood Solar Thermal Project: www.cleanenergyresourceteams.org/files/Solar_Pioneers_Report_GreenInstitute_Dec2007.pdf
 - Visit www.cleanenergyresourceteams.org/technology/solar/thermal.

Ask a Cascade Meadow staff person or representative to show you the trend and live data from the solar thermal system, or find it on our website at www.cascademeadow.org.

Learn More

Cascade Meadow’s website provides lots of additional information about various sustainability technologies. Visit www.cascademeadow.org for more details, and watch the website’s Events page to learn about upcoming workshops and events that can help answer your sustainability questions.

demonstrate • educate • participate

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