



Questions to ask when comparing Solar Hot Water Proposals:

System Design:

- Is this system designed specifically for **my hot water demand** or is this a generic system recommended by a component supplier?

At ReVision Energy we don't believe in a 'one size fits all' design for renewable energy; we approach each project as unique. When designing a solar thermal system, our renewable energy specialists carefully evaluate the demand, the site conditions as well as the home's existing mechanical systems and then design a system specific to your situation.

This means we sometimes install flat plate collectors and other times we install evacuated tubes. Sometimes our systems are backed up by oil or gas boilers, and other times they are backed up by electric elements or on-demand water heaters. For each application there is an appropriate solution and our designers and installers work hard to pinpoint the proper solution for you. If you have a specific question about why we've made a recommendation one way or the other, please don't hesitate to ask and your system designer will be happy to explain it to you.

- How did you determine the appropriate size for my system?

Appropriate sizing of solar hot water systems is critical to optimize system performance and return on investment. If the system is too large, your economic efficiency is reduced because the cost goes up without any substantial extra production. If the system is too small, the performance is sub par and you don't get the best bang for your buck.

For most solar domestic hot water systems, the design goal is to provide between 90 and 100% of the domestic hot water load in the non heating season (May to October). This is particularly important for systems which are backed up by a conventional high mass oil or gas boiler. Keeping the boiler off in the months where it isn't needed for heating the house maximizes the savings from a solar domestic hot water system. These boilers are tremendously wasteful and as a result of their mass and their design, it takes a lot of energy to get and keep them warm, even when the demand is small. Because of this, a system with an 80% solar fraction may actually save only ½ as much oil as one designed for 90-100% summertime solar fraction. Changing the electronic controls of the boiler to keep it off in the months when it isn't needed for heating the house can double the oil savings that result from a solar domestic hot water system.

- If the system is sized to tackle 90-100% of the summertime hot water load (as it should be), what happens when I go on vacation in August and don't use any hot water for a week?

Preventing system over-heating conditions is an important design consideration of any solar hot water system. The simplest way to prevent over-heating is to undersize the



collector array with respect to the demand, but as discussed above, this has other negative implications on system performance and economics.

All ReVision Energy solar hot water systems are designed with over-heat protection built right into the system. In most cases, ReVision Energy employs what is known as a 'vapor drainback' method to prevent overheating the solar tank in case of abundant sunshine and little or no hot water demand. In this design, when the solar tank has been fully heated and can no longer absorb heat from the collectors, the solar controller disables the solar circulation pump. With no flow, the collector heats up rapidly and a small amount of the water/glycol mixture in the collector begins to boil. As it evaporates, the resulting steam pushes the glycol out of the collector and down into a specially selected membrane expansion tank. The glycol will remain in the expansion tank until the collectors cool down (sun sets), at which point the collectors will automatically refill. This vapor drainback method protects the glycol and the solar loop components from damaging temperatures and allows ReVision Energy to size its solar hot water systems aggressively, thus getting you the best bang for your solar buck.

- Are boiler control improvements included in the proposed system?

Most New England homes get their hot water from their oil boiler, and most boilers are 'dumb', meaning that they do not have sophisticated electronic controls to change the boiler's operation according to how much heat is needed. Because oil boilers tend to be wasteful and inefficient, it seems silly to install a solar hot water system without also considering the boiler. Your ReVision Energy system designer will always consider appropriate boiler control upgrades that can happen concurrent with the solar hot water installation to get you the best possible savings for your investment. At the very least, we always recommend (if possible) converting 'maintained' boilers to a 'cold start' control mode to keep the boiler off in the summer months. Depending on the circumstances, your system designer may also suggest additional boiler control improvements such as replacing pumps with zone valves, installing outdoor reset control, post purge, or a smart burner control—all of which can significantly reduce oil consumption.

- Does the system include specific design considerations for recovering from power outages?

Because the system uses AC pumps, the solar hot water system will not operate during a power outage (unless you have a backup generator or battery backup PV system). However, the system IS designed to recover gracefully from such an event. If the power is out and the sun is shining brightly, the system may go into vapor drainback mode (see above), but as soon as the collectors fall back below their maximum temperature (either a passing cloud or nightfall), the system will recover and begin working again. No homeowner intervention is required.

- If a two tank system is proposed, has some accommodation been made to move heat from the solar tank to the boiler tank in times of good solar input but no hot water demand?



While a single, dual-coil tank is usually preferred due to its smaller footprint and reduced standby heat loss, there are some situations where the installation of a separate solar preheat tank is appropriate. In these situations it is important to provide some means for moving solar heated water from the preheat tank to the boiler tank. Without this you could end up in the unfortunate situation where the solar tank is piping hot from the sun, but the boiler still gets called on to heat the second tank, which is just a shame. In our dual tank installations, ReVision Energy includes a small, low wattage bronze circulator pump which moves heat from the solar tank to the boiler tank whenever the solar tank is hotter, thus allowing the sun to effectively heat both tanks.

- If there is a recirculation line, does the tank include a recirculation port to keep the recirculation from turning over the entire solar tank?

In larger homes hot water recirculation lines are commonly used to reduce the wait for hot water at the taps which are far from the hot water tank. If your home has such a system and you are considering a solar domestic hot water system, then the integration and control of the recirculation line is critical. The recirc line should be controlled by a thermostat and a timer so it only operates as much as it has to. In addition the return water from the recirculation line should NOT be returned to the cold inlet of the solar tank, as this can destratify the tank and reduce the efficiency of the solar collectors. The Stiebel Eltron SBB tank has a specially designed recirculation port located around the middle of the tank to allow for the connection of a recirc line without loss of solar efficiency.

Component Selection:

- Is the collector certified by SRCC, SPF or other reputable international agencies?

All collectors installed by ReVision energy have been tested and rated by the SRCC (Solar Rating and Certification Corporation), SPF or other reputable international agencies. These tests not only provide an impartial test for comparing the output of various collectors under a variety of test conditions, but also ensure some minimum standard of quality. If you'd like to see a copy of the SRCC test report for a particular collector, we'd be happy to share it with you and explain how the tests are performed and how to use the data.

- What kind of warranty does the manufacturer offer?

Different collectors have different warrantees, but every manufacturer should stand behind the product they sell. ReVision Energy sells only equipment which has been extensively tested by third party agencies and whose manufacturers have a reputation for outstanding products, quality control and customer service. For specific warranty information for your system, please consult your proposal or ask your system designer.

- What is the insulation level of the tank? How much heat loss can I expect?



Solar BTU's are precious and we hate to see them wasted to heat loss. Our tanks have absolutely the best insulation levels in the industry (3" of urethane foam) to minimize the heat loss. In addition, our installers know that on well insulated tanks the bulk of the heat loss happens at the various plumbing connections through conduction or single pipe thermosiphon. For this reason, connections from the tank may be insulated, or provided with a heat trap or both, to minimize heat loss.

- Does the system include a high quality anti-scald mixing valve to control the water temperature at the tap?

Solar domestic hot water systems can produce hot water in excess of 150 degrees. This is much hotter than typical tap water temperature (115-120 degrees) and can present a scalding risk. For this reason, **every solar hot water system should include a high quality, anti scald mixing valve as a standard component.** The mixing valve blends cold water together with the hot water leaving the tank, to maintain a steady and safe and comfortable water temperature at the tap at all times. There is a huge variety in mixing valve quality and longevity, but ReVision Energy uses only the highest quality, brand name mixing valves to ensure a safe and comfortable system.

- Does the system include a flow meter where I can visually check for both the flow and the condition (color) of the glycol?

While not absolutely critical to the operation of the solar domestic hot water system, it is nice to be able to visually verify the flow and to periodically check the condition (color) of the antifreeze mixture. Most all ReVision Energy solar hot water systems include a pump station which includes a flowmeter and sight glass.

- Does the system include a digital differential temperature controller which allows you to see collector temperature, tank temperature and production hours?

The SOM 6 and SOM7 differential temperature controllers which are included with most ReVision Energy solar hot water systems include an LCD display which allows the homeowner to view Collector temperature, Tank temperature as well as total hours of solar production to date. Additional data (such as BTU's, top of tank temperature etc) may be displayed in some cases.

Installer Qualifications and Experience:

- Who is going to do the installation?

ReVision Energy understands that getting the installation details right matters in the performance and reliability of the system. We also understand that buying hardware from one place and paying someone else to install it is a hassle that you just don't need.



For this reason, we install everything we sell, and we only sell things that we install. Our installers all work for ReVision Energy (no subcontractors) and are licensed, trained and truly expert in their field. We believe that this provides our customers with the highest level of quality and streamlines the installation process for our customers.

- What are their qualifications?

ReVision Energy employs licensed plumbers, electricians, and wood, gas and oil boiler specialists. In addition every member of your installation will be a certified solar energy installer through the State's Public Utility Commission State Energy Program. In addition, our project managers and installers all benefit from our extensive in-house research and training program. Having installed close to one thousand solar hot water systems in Maine, ReVision Energy technicians have the benefit of vast experience with every possible situation ranging from complicated system integration, to challenging roof mounting, to local aesthetic considerations.

- How many similar systems have you installed?

In the last three years alone, ReVision Energy has installed hundreds of solar hot water systems in Maine. If you'd like to go see a ReVision Energy system near you or to talk to a former customer, just ask and we're certain to be able to provide you with a referral in your area.

- Will the installer provide routine system service for the life of the system?

The solar hot water systems installed by ReVision Energy are virtually maintenance free and are designed to last for between 20 and 30 years. In order to keep them working flawlessly and to maximize their performance, we typically recommend a routine system service. Most systems are serviced every 3 years. As part of our commitment to full service and professional renewable energy system installation, ReVision Energy will continue to service any system we've installed for the life of that system.

- Does the installer provide around-the-clock emergency service?

While it is extremely rare, nothing is worse than having a problem with a mechanical system in your home and not being able to reach a competent technician to help you solve the problem. As part of our commitment to full service design, installation and service of renewable energy systems, ReVision energy provides a 24-hour emergency service telephone number where, in an emergency, you can reach a qualified technician who can help you solve your issue. While we are glad that we rarely ever need this service, it provides additional piece of mind to our customers who have trusted us to provide a part of their home's mechanical systems.