



Commercial Solar Hot Water Buyers Guide

**The 20 Questions you Must Have
the Answers to When Buying a
Commercial Solar Hot Water System**

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Your Plumbing and Solar Specialists since 1989

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Below Are the Solar Hot Water Questions People MOST OFTEN ASK Their PLUMBING and SOLAR Specialist



How do solar hot water collectors work?



Solar hot water collectors collect heat from the sun's heat radiance to directly heat domestic hot water that is circulated through the collectors and then back to a solar thermal storage tank or water heater to supply hot water to the home or facility.

Some solar hot water systems use a transfer fluid in a sealed system that is pumped up to the collectors, heated and returned to a storage tank to heat the water supply.

Solar water heating systems include **storage tanks** and **solar collectors**. There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't.

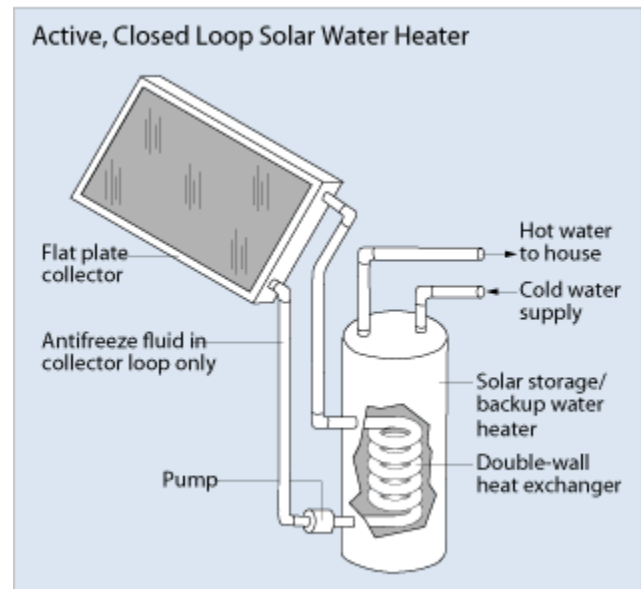
Three types of solar collectors include:

Flat-plate collector

Glazed flat-plate collectors are insulated, weatherproofed boxes that contain a dark absorber plate under one or more glass or plastic (polymer) covers. Unglazed flat-plate collectors—typically used for solar pool heating—have a dark absorber plate, made of metal or polymer, without a cover or enclosure.

Integral collector-storage systems

Also known as ICS or batch systems, they feature one or more black tanks or tubes in an insulated, glazed box. Cold water first passes through the solar collector, which preheats the water. The water then continues on to the conventional backup water heater, providing a reliable source of hot water. They should be installed only in mild-freeze climates because the outdoor pipes could freeze in severe, cold weather.



Evacuated-tube solar collectors

These collectors feature parallel rows of transparent glass tubes. Each tube contains a glass outer tube and metal absorber tube attached to a fin. The fin's coating absorbs solar energy but inhibits heat loss. These collectors are used more frequently for U.S. commercial applications.

There are two types of active solar water heating systems:

Direct circulation systems

Pumps circulate water through the collectors and then into the home or business. They work well in climates where it rarely freezes.

Indirect circulation systems

Pumps circulate a non-freezing, heat-transfer fluid through the collectors and a heat exchanger. This heats the water that then flows into the home or business. They are popular in climates prone to freezing temperatures.

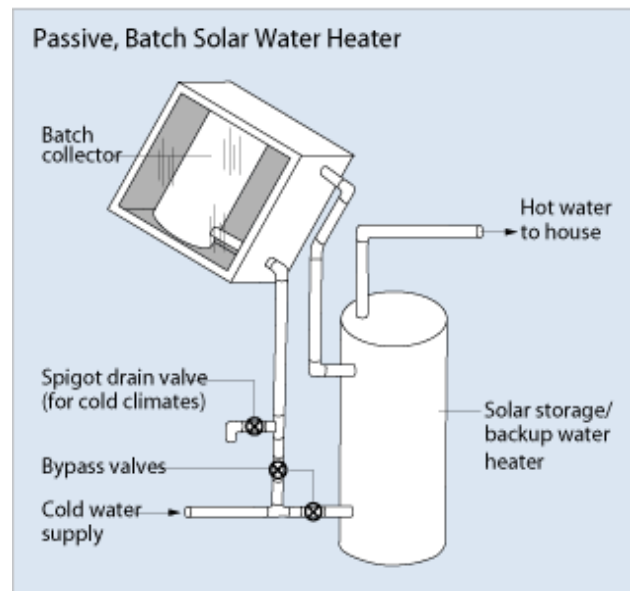
There are two basic types of passive systems:

Integral collector-storage passive systems

These work best in areas where temperatures rarely fall below freezing. They also work well in homes or businesses with significant daytime and evening hot-water needs.

Thermosyphon systems

Water flows through the system when warm water rises as cooler water sinks. The collector must be installed below the storage tank so that warm water will rise into the tank. These systems are reliable, but contractors must pay careful attention to the roof design because of the heavy storage tank. They are usually more expensive than integral collector-storage passive systems.



Solar water heating systems almost always require a backup system for cloudy days and times of increased demand. Conventional storage water heaters usually provide backup and may already be part of the solar hot water system package.



How does solar hot water differ from solar electric?



Solar hot water is different than solar electric in that solar hot water collectors collect heat from the sun's radiance to directly heat the domestic or commercial hot water supply.

Solar electric collectors generate electricity by converting the sun's energy into electrical energy which then flows through the electrical circuits connected to the solar system. A Direct Current (DC) is generated, put through a device called an Alternator which converts the current to Alternating Current (AC) and then can be used to power lights, appliances, etc. in your home or business.

Solar power is an excellent way to provide needed power to your house or business in an environment friendly fashion. Whether you are considering a photovoltaic system or solar water heating system, you are doing something to benefit the environment and, most probably, your financial situation.



Will solar hot water work on cloudy or rainy days?



A Solar Hot Water System needs the sun's energy to heat the domestic or commercial hot water supply. Most solar collectors will still produce 40% to 60% of their rated capacity on a mildly cloudy day.

Rainy days will have a significant impact on solar hot water capabilities for obvious reasons.



Solar water heating systems almost always require a backup system for cloudy days and times of increased demand.

Conventional storage water heaters usually provide backup and may already be part of the solar system package. Many homes and commercial businesses use tankless or instantaneous hot water systems for backup.

A backup system may also be part of the solar collector, such as rooftop tanks with thermosyphon systems.

The one thing you can count on is your solar hot water system is saving you money whenever the sun is shining on your collectors.



Are solar hot water collectors hurricane rated?



While nothing is hurricane proof, our solar thermal collectors are very sturdy. We have years of experience in installing major commercial solar hot water systems and all of our installations are preformed to meet your local building code standards.



Our headquarters is located in South Florida and our solar equipment, like other exterior equipment and building materials, installed in Florida must meet the new statewide code that requires affected products to withstand 130 mph winds.

We make sure that your solar panels are integrated with the roofing system and are designed to minimize stress during inclement weather. Solar collectors have performed remarkably well during major storms, and are resistant to hail and ultraviolet radiation.



Will I run out of hot water?



While some companies are marketing 100% solar hot water systems, we do not recommend this and as such all of our systems come with an alternative back up water heating method.



The answer would be 'No', because the temperatures from a solar water heater (reaches and exceeds 140F) is much higher than a conventional water heater (120 to 130F). Therefore, your existing water heater works very little compared to not having a solar water heater installed.

Additionally, your existing system serves as backup to the solar system ensuring that you will continue to have as much or more hot water than before. On top of that, you will be able to get more years out of your existing water heater.



What maintenance is involved with a solar hot water system?



Solar hot water systems are relatively maintenance free. However with any mechanical system periodic checkups and maintenance should be performed. This would consist of checking pumps to verify proper operation, rinsing dust off of the collector, inspecting pipe insulation, inspecting pipe connections at the tank, and checking fluid levels in an indirect system.

You might be able to handle some of the inspections and maintenance tasks on your own, but others may require a qualified technician.

Periodic Inspection List

Here are some suggested inspections of solar system components. We will also provide you with an owner's manual for your new system with a suggested maintenance schedule.

- **Collector shading**
Visually check for shading of the collectors during the day (mid-morning, noon, and mid-afternoon) on an annual basis. Shading can greatly affect the performance of solar collectors. Vegetation growth over time or new construction on your house or your neighbor's property may produce shading that wasn't there when the collectors were installed.
- **Collector soiling**
Dusty or soiled collectors will perform poorly. Periodic cleaning may be necessary in dry, dusty climates.
- **Plumbing, ductwork, and wiring connections**
Look for fluid leaks at pipe connections. Check duct connections and seals. Ducts should be sealed with a mastic compound. All wiring connections should be tight.
- **Piping, duct, and wiring insulation**
Look for damage or degradation of insulation covering pipes, ducts, and wiring.
- **Roof penetrations**
Flashing and sealant around roof penetrations should be in good condition.
- **Support structures**
Check all nuts and bolts attaching the collectors to any support structures for tightness.
- **Pressure relief valve (on liquid solar heating collectors)**
Make sure the valve is not stuck open or closed.
- **Dampers (in solar air heating systems)**
If possible, make sure the dampers open and close properly.
- **Pumps or blowers**
Verify that distribution pumps or blowers (fans) are operating. Listen to see if they come on when the sun is shining on the collectors after mid-morning. If you can't hear a pump or blower operating, then either the controller has malfunctioned or the pump or blower has.
- **Storage systems**
Check storage tanks, etc., for cracks, leaks, rust, or other signs of corrosion.



What is the cost of a typical solar hot water system?



A typical residential system will cost \$5,500 to \$6,500. And a typical commercial solar hot water system will cost \$80 to \$150 per foot of collector area.

It's very important that you receive a fair estimate from a **licensed solar contractor** who understands all the costs involved in purchase and installation of a new solar hot water system and knows all the tricks on how to save you money and get the best deal available. Your typical salesperson has no idea how to get you the best deal depending on all your custom requirements. This is a case where the true professionals don't cost you more money, they end up saving you more money.

And, the Question 8 gives you the information you need to know about local and federal incentives for using solar.



Are those prices before tax rebates and local incentive programs?



Yes, you would reap the benefits of any local and federal incentives available. For current incentives refer to www.desireuse.org to research available incentives. You can also **give us a call at 1-800-870-6321** and we can let you know the latest news on these money saving incentives. We stay up with all the changes and will be more than happy to tell you what's hot right now and when any of the tax incentives expire.



In the USA the residential federal tax credit for solar includes:

30% of cost with no upper limit. (Expires: December 31, 2016)

Details: Existing homes & new construction qualify. **Both principal residences and second homes qualify.** Rentals do not qualify.

For commercial businesses, the Business Energy Investment Tax Credit (ITC) is now available for eligible commercial solar thermal systems placed in service on or before December 31, 2016.

- The solar ITC credit is equal to 30% of expenditures, including solar design, installation labor, and components.
- Eligible solar energy properties include equipment that uses solar energy to generate electricity or to heat or cool water for use in a structure, or to provide solar process heat.

- At this time, passive solar systems and solar pool-heating systems are not eligible.

Contact us at 1-800-870-6321 for additional information or with questions about credits available outside the USA.



How much money will a typical commercial solar system save me?



A typical commercial system has an 8 to 12 year payoff. A typical commercial system in Belize or other Caribbean countries can payback in 5 years due to high energy costs. A typical residential system will save \$30 to \$40 a month. There is no doubt that a quality commercial solar hot water system is an investment that continues to pay you dividends for years.



Are you qualified to do government or military base work?



Yes, as this market sector continues to expand with ARRA (American Recovery and Reinvestment Act) stimulus funding and military bases scrambling to become compliant with the Bush mandates for base alternative energy requirements, **Zager Plumbing and Solar has been fully qualified and certified to work with our government facilities and military bases.** We are very proud of this partnership because we know it is based on our extensive experience in designing, installing and maintaining the latest in solar energy equipment.



Below Are the Solar Hot Water Questions People SHOULD Ask Their PLUMBING and SOLAR Specialist



Should I use flat plate collectors or evacuated tube collectors? What is the right technology for me?



In residential applications flat plate collectors are the norm, however commercial systems are a bit more complicated.

Most commercial institutions run higher boiler and return loop temperatures averaging 140 degree to 160 degree supply temperatures prior to the mixing valve with 106 to 110 degree water on the return loop. Flat plate collector production curves start to fall off after a $T_i - T_a$ (temperature in minus temperature ambient) 36 degrees, frequently producing less than half of its rated name plate.



Commercial solar hot water evacuated tubes are still going strong putting out about 75% of their name plate rating. This equates to higher system efficiency with evacuated tubes if your building is operating at higher boiler loop temperatures.



What type of system is right for me... open or closed loop, direct or indirect?



Each system has its place depending upon the application.

For residential systems in a non-freezing climate we would recommend a direct closed loop system.

For a residential system in a freezing climate indirect closed loop gets the thumbs up.

In commercial applications indirect open loop gets the nod.



Will my roof warranty be voided by installing solar thermal panels?



This is an excellent question because **hiring the wrong company to install your solar hot water system can cause you many problems with your roof** if the job is not done by professionals trained in the latest techniques in sealing any potential problem spots.

So your answer is 'No' if the penetration points are sealed properly per the manufacturer's guidelines. **If the roof was recently installed the installing roof contractor may have to be the one to seal the penetrations to avoid allowing that contractor opportunity to void your warranty.** We work with the owner to insure that all points are sealed completely and correctly to prevent any warranty issues.



What if I live in a freezing climate do I have to use glycol in my system?



Not necessarily, systems can be designed to drain the water out of the collectors when subject to freezing conditions.

For protecting the collector and piping from damage due to freezing temperatures, you basically have two options:

- **Use an antifreeze solution** as the heat-transfer fluid.
- **Drain the collectors and piping that make up the collector loop**, either manually or automatically, when there's a chance the temperature might drop below the liquid's freezing point.



Using an Antifreeze Solution

Solar hot water heating systems that use an antifreeze solution (propylene glycol or ethylene glycol) as a heat-transfer fluid have effective freeze protection as long as the proper antifreeze concentration is maintained. **Antifreeze fluids degrade over time** and normally should be changed every 3-5 years. Since these systems are pressurized, it is not practical for the average homeowner to check the condition of the antifreeze solution. If you own this type of system, **have a solar heating professional check it periodically.**

Draining the Collector and Piping

Solar water heating systems that use only water as a heat-transfer fluid are the most vulnerable to freeze damage. "Draindown" or "drainback" systems typically use a controller to drain the collector loop automatically. Sensors on the collector and storage tank tell the controller when to shut off the circulation pump, to drain the collector loop, and when to start the pump again.

Improper placement or the use of low-quality sensors can lead to their failure to detect freezing conditions. The controller may not drain the system, and expensive freeze damage may occur. We make sure that the sensor(s) have been installed according to the manufacturer's recommendations, and we can also check the controller at least once a year to be sure that it is operating correctly.

Collectors and piping must be designed and installed by trained technicians so they slope properly to allow the water to drain completely. All collectors and piping should have a minimum slope of 0.25 inches per foot (2.1 centimeters per meter).



What if I live in a sunny climate?



Then the problems associated with freezing of the solar equipment are not present and there is no need to use glycol based systems as they are just not necessary.



Do I need a heat dump for my commercial solar hot water system?



That will depend on the design of the system. In northern climates, using indirect glycol based systems, heat dumping in the summer months must be considered in the design. If an open loop system is installed then heat dumping can be taken care of by draining the system to avoid overheating.

We take care to design your system correctly from the start so you should never be bothered by all these technical issues. This is what we do and we've been doing it for years very successfully and we can do it for you.



Why is a plate heat exchanger typically a bad idea?



Although ASHREA shows using plate heat exchangers as an acceptable method to transfer btu's from a working fluid to the domestic hot water, precaution must be taken in this design as boiler loop temperatures are frequently higher than the collector loop temperatures. Again, this is a technical issue that we are trained to handle and we can explain all the details to you as we design your new commercial solar hot water system.



Can I use my existing hot water tank?



For residential, the answer would be Yes. A solar hot water system works in conjunction with your existing gas or electric hot water heater. In most situations, the addition of a solar hot water system will extend the life of your existing system by reducing the amount of scaling.

In commercial applications the existing boiler tanks are typically too small to meet optimum system efficiency. In warmer climates we recommend the storage tank to be sized at 2 gallons per square foot of collector.



What if my roof does not face south can I still install a solar hot water system?



Usually yes, either by using a custom made mounting system or by ground mounting. We have worked with many situations requiring custom design to take full advantage of the sun's power and we can show you how to overcome just about any problem in this area.



Why choose Zager Plumbing and Solar?



Our atypical design approach for commercial solar thermal hot water heating systems utilizing open loop immersed heat exchangers, offer many benefits to building and facility managers. By **eliminating the additional components needed in heat dumping and closed loop glycol systems** there is **less maintenance, no chemicals** to contend with and **fewer parts to go bad**. Additional benefits include a **higher system overall efficiency** through the use of immersed heat exchangers.



Zager Plumbing and Solar, Inc., founded in 1989, is a well established and highly respected **Commercial and Residential Plumbing and Solar Power Contracting Company** headquartered in South Florida and **serving clients on a national and international basis**. We are seasoned and experienced in other countries with full shipping capabilities. We ship materials, equipment, vehicles and manpower to anywhere in the world we are needed.

If you are considering a major **Commercial Plumbing, Solar PV or Solar Hot Water System**, please [Contact Us](#) for details on how we can work with you to bring your project in **on time and within your budget**. Please see the next page for more details and for full contact information and the address of our website.

Zager Plumbing and Solar Inc. will give you all the details you need to make a smart buying decision.

**This Commercial Solar Hot Water
Buyers Guide is Brought to You by
Zager Plumbing and Solar.**

**Your National and International
Plumbing and Solar Heating Specialists**



Delivering Top Quality Work and Peace of Mind Since 1989

We're Proud Members of:

- ✓ **Dun & Bradstreet Small Business Solutions**
- ✓ **Florida Solar Energy Industries Association**
- ✓ **Plumbing Heating Cooling Contractors Association**
- ✓ **American Solar Energy Society**
- ✓ **International Solar Energy**
- ✓ **“Green” Hotels Association**
- ✓ **Florida Alliance for Renewable Energy**

If you have additional questions, please visit our website

www.Zager-Plumbing-and-Solar.com

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