

Solar Info Guides

Solar Hot Water Basics



Innovating Today's Solar Technology
for the Future of Tomorrow

What is Solar Hot Water?

Solar Hot Water, or Solar Thermal, is basically the use of the sun to heat water, for whatever end use. In its simplest form, solar hot water is as plain as placing a jug of water in the sun and letting it warm up, or the warm water that comes out of a garden that has been left out in the sun when it is first turned on. However, today, technology exists that makes Solar Hot Water one of the most efficient, cost-effective and widely used forms of renewable and solar energy on the market today.

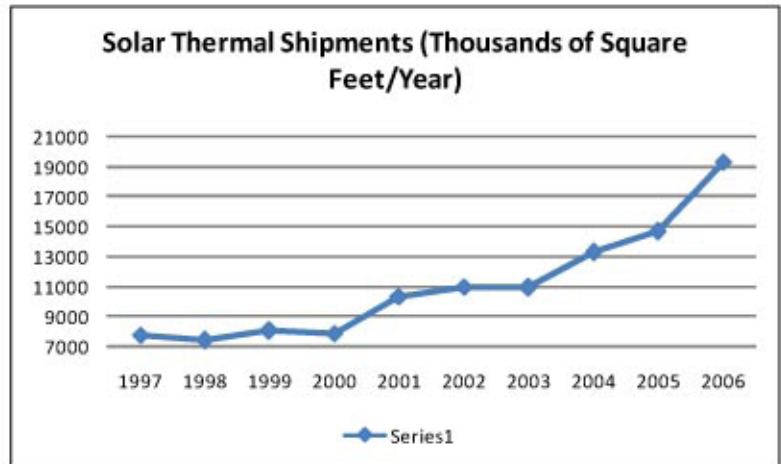
Today, Solar Hot Water Systems feature extremely efficient solar collectors, storage tanks, heat exchangers, and a plethora of other components that make them extremely useful and versatile for a wide variety of applications in residential and commercial locations around the world.

And, with the improvements in solar thermal technology over the last 2 plus decades, Solar Hot

Water Systems are upwards of 70-80% efficient, providing higher returns on investment and shorter payback periods than ever before. Today, Solar Collectors for Solar Hot Water Systems are available in 2 basic types: Flat Plate Solar Collectors and Evacuated Tube Solar Collectors.

Here are a few facts about today's energy realities:

- The average American home spends 40%, or more, of its total energy bill on domestic hot water and home heating
- Typically, domestic hot water accounts for nearly 20% of the average home's energy bills alone
- Today's key fossil fuel supplies are controlled by a group of nations which have historically been hostile to the United States: Iran, Iraq, and Saudi Arabia, among others.
- The price of oil is reaching new all-time highs every single day, with no relief expected in the near future
- As supplies of oil become to fall behind demand, prices will spike to astronomical prices, making it nearly impossible to afford the standard costs of living
- Renewable Energy Sources, such as Solar Hot Water, can save hundreds, or thousands, of dollars a year in energy costs and the savings will only increase in the coming years as the prices for traditional energy sources continue to rise.



There has been a recent rebirth in Solar Energy sales and installations in the United States, after a severe dropoff following the solar bust of the 1970's and 80's.

The chart to the left shows the current 10 year trend in the growth of shipments of Solar Thermal (hot water) heating systems in the United States. This trend is expected to continue to rise at increasing rates in the near future

Solar Hot Water Applications

Solar Hot Water Systems can be used for a variety of applications. In fact, if hot water is needed for a certain application, chances are that SunMaxx Solar Hot Water Systems can be incorporated into it. SunMaxx Solar Hot Water Systems are used across the United States and around the world in a variety of uses for:

- Residential Applications
- Commercial Applications
- Municipal Applications
- Agricultural Applications
- Industrial Applications

There are three main uses of Solar Hot Water Systems, and more than 90% of the SunMaxx Solar Hot Water Systems in use today are at work in one of these types of use:

Domestic Hot Water

is the general hot water that you use around your house or office everyday. This water is generally used for showers, baths, washing dishes, doing laundry, cleaning and other hygienic uses. This is one of the most popular, efficient and cost-effective uses of Solar Hot Water available today. With SunMaxx's varied line of Solar Collectors and Solar Hot Water Systems, customers in nearly every location and climate can use Solar Hot Water to offset 50%, or more, of their domestic hot water needs. Today, with rising energy costs, domestic hot water alone can account for 20%, or more, of the average home's total energy bills.

Solar Radiant Heating & Cooling

is another great use of a Solar Hot Water System. By using the hot water generated by your SunMaxx Solar Hot Water System, you can heat your home or office with incredible efficiency, and more cost-effectively than ever before, especially considering the current costs of heating oil, and other fuels. For heating, SunMaxx Solar Hot Water Systems can be used in a variety of different heating system types, increasing the versatility and reducing the installation costs. SunMaxx recommends the following heating systems for Solar Hot Water integration:

- In-Floor Radiant Heating
- Baseboard Radiant Heating
- Forced Hot Air (with Air-to-Water Heat Exchanger)

And, by using a hot water-fired chiller, your SunMaxx Solar Hot Water System can be integrated into a central cooling system to provide efficient and affordable cooling for your home or office on those unbearably hot summer days.

Solar Pool & Spa Heating

is one of the most popular uses of Solar Hot Water Systems today. By using your SunMaxx Solar Collectors to heat the water in your pool or spa, you can reduce the amount of electricity, propane or natural gas you currently use for heating, lowering your energy bills significantly every year. *A pool or spa is also the ideal for a heat dump for your solar hot water system - using the excess heat generated by your system in the summer months to offset a portion of your pool/spa heating bills at the same time, without sizing a solar hot water system specifically for the application.*

System Pricing & Payback

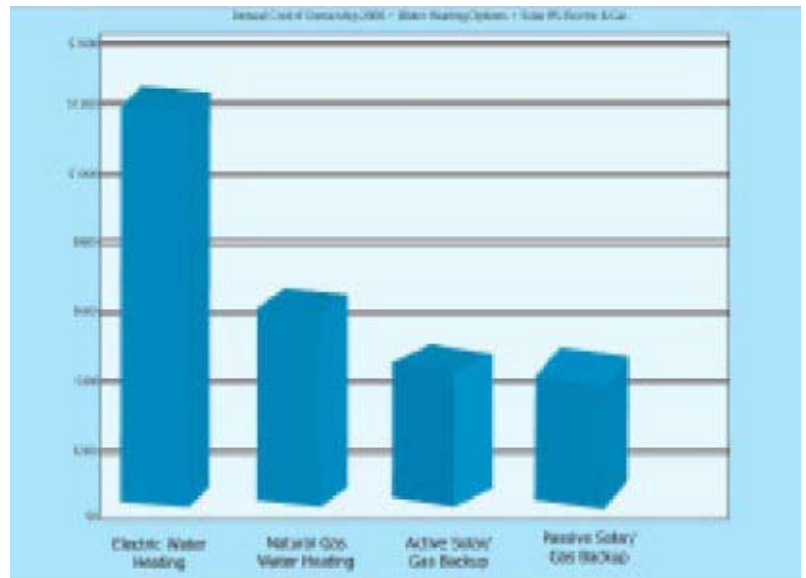
Unfortunately, many of today's Solar Hot Water manufacturers and distributors are looking to take advantage of the recent spike in interest of Solar Thermal Technology, and make a huge profit in the short term. Silicon Solar, however, is looking at the long-term trend of Solar Hot Water, and is looking to supply customers around the world with Solar Water Heaters that are affordable, offer short payback periods, and deliver high returns on investment over the lifetime of the system.

We have a belief at Silicon Solar – Solar Hot Water Heaters are a sound investment, and good for the environment, and there is no need for the initial price of these systems to be more than the average home owner can afford. If we are to make Solar Energy a viable alternative to today's fossil fuels, we must make these systems affordable on almost every budget so that clients from all walks of life can afford them. **SunMaxx Solar Hot Water and Home Heating Facts:**

- A properly sized SunMaxx Solar Hot Water System should be able to offset well over 50% of your domestic hot water

home heating and/or pool/spa heating needs

- SunMaxx Domestic Solar Hot Water Systems are available for under \$5,000 dollars, and can pay for themselves in just a few years
- SunMaxx Pre-Packaged Systems are available for Domestic Hot Water, Solar Radiant Heating and Solar Pool/Spa Heating, making it easier than ever before to purchase and install a Solar Hot Water System
- SunMaxx Evacuated Tube Solar Collectors are SRCC Certified and Solar Keymark Certified
- SunMaxx Flat Plate Solar Collectors are Solar Keymark Certified and SRCC Certification is pending
- SunMaxx Evacuated Tube Solar Collectors produce more BTUs per day and per dollar invested than any leading competitor according to SRCC Standardized Testing
- SunMaxx Solar Hot Water Systems are ideal for residential, commercial, municipal, industrial and agricultural uses



The chart to the above shows the expected costs for annual operation of a variety of different water heaters.

The graph compares solar water heaters with natural gas and electric water heaters.

Solar Hot Water Systems are significantly less expensive to operate than the natural gas and electric systems, and will continue to be more and more cost-effective as the prices for fossil fuels and electricity continue to rise over the coming years.

Typical Solar Pool Heating System Design

Federal	Residential Solar and Fuel Cell Tax Credit
Incentive Type	Personal Tax Credit
Eligible Technologies	Solar Water Heating, Photovoltaics (Solar Electric), Fuel Cells, Other Solar Technologies
Applicable Sectors	Residential
Amount & Max Incentive	30% (up to \$2,000)
Carryover Provisions	Excess may be carried forward to the succeeding tax year
Eligible System Size	No specification
Requirements	Solar Water Heating property must be certified by the SRCC or by a comparable entity endorsed by the state. At least half the energy used to heat the dwelling's water must be from solar in order for the solar water heating property expenditures to be eligible
Date Enacted	8/8/2005
Effective Date	1/1/2006
Expiration Date	12/31/2008

Additionally, the Federal Government has a special Solar and Fuel Cell Tax Credit for commercial applications, which follows the same general structure as the residential credit - the commercial credit, however, is uncapped (no maximum credit amount).

Also, many states (all to date) have their own specific Solar Energy Incentives and credits that can be applied to the purchase of your solar system in conjunction with the Federal Credit to further lower the cost of your system. The State incentives vary from state to state, as do their amounts and requirements. Please contact Silicon Solar for additional detailed information on State and Federal Solar Incentives and Credits.

For a more detailed breakdown of Solar Hot Water Incentives and Tax Credits throughout the United States, please see our Solar Hot Water Incentives Guide.

For additional information of the Federal Solar Tax Credits please use the following contact:

Public Information - IRS
Internal Revenue Service
1111 Constitution Ave, N.W.
Washington, DC 20224

Phone: (800) 829-1040
www.irs.gov

Basic Solar Hot Water System Types

There are several different ways that your SunMaxx Solar Hot Water System can be installed. These different system designs make Solar Hot Water extremely versatile, and able to function in a wide variety of climates, locations, weather conditions and applications.

There are two main distinctions in types of systems. It is important that you understand these different system types when you are looking into purchasing and installing your Solar Hot Water System.

- Open-Loop Systems vs Closed-Loop Systems
- Passive Systems vs Active Systems

Each of these system types have their own distinct advantages and disadvantages when compared to each other and when looked at individually as well.



Open-Loop Systems

In this type of system, your potable water, is fed through the solar collector directly and heated before it is used for domestic purposes. In this type of system, the water main is fed directly into the solar collector and is moved either to a storage tank within the home, or directly to the domestic water fixtures in an on-demand style system.

Closed-Loop Systems

In this type of system, your solar collector loop is kept separate from your potable water, which is heated indirectly by a heat exchanger within, or external to the solar storage tank. This type of system is most often used with a glycol solution, which provides freeze protection, allowing the system to be used effectively in colder, northern climates with temperatures down to -60 degrees fahrenheit.

Active Systems

These systems use mechanical parts to operate the water flow. These parts include differential temperature controllers and circulator pumps. These systems can be more reliable, and recommended in certain locations, but do have a higher need for maintenance and more points of possible failure within the system.

Passive Systems

These systems use no mechanical parts to operate. They simply run off gravity, or off the mains water pressure. In its simplest form, a SunMaxx Thermosyphon Solar Hot Water System is a passive solar hot water system, requiring only the pressure from the water main to pass water through the system in an on-demand fashion.

Typical System Components

Solar Hot Water Systems require a number of key components to operate efficiently and as cost-effectively as possible. These components work together seamlessly, and assist in incorporating your new Solar Hot Water System with your existing hot water system, home heating system or pool/spa heater to reduce your energy bills without any hassles and huge overhead costs.

The major components of Solar Hot Water System are:

Solar Collectors

Whether you use Evacuated Tube Solar Collectors or Flat Plate Solar Collectors, these are the heart and soul of your Solar Hot Water System. Without today's efficient and affordable SunMaxx Solar Collectors, Solar Hot Water Systems would not be a viable, af-



fordable option for millions of Americans and citizens around the world. By capturing the UV radiation from the sun, converting it to heat and transferring it to your potable water or a Heat Transfer Fluid (HTF), SunMaxx Solar Collectors make it possible to generate your hot water and heating needs for a fraction of the cost of your current traditional fuel powered heating system.

Solar Hot Water Storage Tank

A Solar Hot Water Storage Tank is specifically designed to operate in concert with today's SunMaxx Solar Collectors and Solar Hot Water Systems. These tanks feature thick insulation, stainless steel construction, easy plug n play connections and internal copper coil heat exchangers making it extremely easy to design and install a closed-loop solar hot water system. These tanks can be coupled with an electric backup heating element to be a standalone hot water heater that can replace the current hot water boiler at a location, or plumbed in series with the existing water heater to provide a pre-heat tank that is always full of hot water to meet the demands of large households, or those that use more hot water than the average family.

Solar Hot Water Heat Exchangers

There are a variety of Solar Hot Water Heat Exchangers available today, and most are designed to fit specific needs of solar hot water systems for different applications and locations. The main types of Solar Hot Water Heat Exchangers are:

- Copper Coil - these are typically found within a Solar Hot Water Storage Tank, allowing you to create a closed loop solar hot water system with a new, solar specific hot water storage tank
- Brazed Plate - these heat exchangers feature a number of copper plates with a small space between them, allowing your HTF and potable water to pass through, separate from each other while providing adequate heat transfer to create an efficient and cost-effective closed loop system for domestic hot water or radiant heating applications
- Shell & Tube - these heat exchangers are specifically designed for pool & spa heating as well as marine solar hot water applications. Typically they are made from stainless steel, which is not susceptible to corrosion from contact with chlorinated water like a copper heat exchanger would be
- Air-to-Water - these heat exchangers operate essentially the same as a car radiator does, allowing hot water to pass through the exchanger and heating the surrounding through a series of radiator fins as it does. These heat exchangers are ideal for using Solar Hot Water Systems in forced hot air central heating systems, and as a heat dump for releasing excess heat from your Solar Hot Water System in the summer months when it is not needed

Differential Temperature Controller

These are designed to provide automatic operation of your SunMaxx Solar Hot Water System, which means a more hassle-free

Typical System Components - cont.

system with less maintenance and less attention. By measuring the temperature of the water in the solar collector header (manifold) and within the storage tank, the controller will determine when your Solar Hot Water System should operate to heat water. This will provide significant energy savings over a system that is operated manually, or allowed to run continuously with no checks in place. The Differential Temperature Controller is the brain of your Solar Hot Water System. Whether you have a small residential system or a large commercial array, this is a component that must be included in your installation.

Solar Hot Water Circulator Pump

The Circulator Pump operates as the heart of your Solar Hot Water System. The pump is controlled by the controller, and is told when to cycle water or HTF through the system to provide heating and to turn



off when heating is not needed, or when there is not enough heat being generated by the solar collectors. Solar Hot Water Circulator Pumps are available in AC models, DC models and PV/Battery controlled models. Each of these types of Solar Hot Water Circulator Pumps have their advantages and disadvantages - you should consult your dealer or installer regarding which type of pump is the most appropriate for your application, budget and desires.

Expansion Tank

An Expansion Tank is a necessary component in a closed-loop system. As water is heated, it expands. The Expansion Tank allows the expanded water a place within the system to escape to until the temperature has lowered and the water or HTF volume has returned to normal levels.

Drainback Tank

A Drainback Tank is used in a Drainback System, where water or HTF is drained from the solar collectors when the system is not in use. This serves as a freeze protection method for protecting the system in cold climates and weather, much like glycol does in a pressurized system. Drainback Systems are one of the most common solar hot water system installation types used today.

There are several other components that are used in Solar Hot Water Systems. These components should not be overlooked in their importance to performance of the overall Solar Hot Water System. These components include:

- Tempering Valves
- Check Valves
- 3-Way Valves
- Automatic Air Bleeders
- Temperature and Pressure Gauges
- Temperature and Pressure Relief Valves
- Copper and Pex Piping
- Quick Connectors, Pex-to-Copper Connectors, Compression Fittings and more

Flat Plate vs Evacuated Tube Solar Collectors

There are distinct advantages and disadvantages to both Flat Plate Solar Collectors and Evacuated Tube Solar Collectors. Because these two different types of solar collectors are designed to provide optimum performance in different climates and locations, SunMaxx offers both types of solar collectors in order to best serve a wider base of customers in a wider range of locations and solar hot water applications.

Flat Plate Solar Collectors

operate much the way a PV solar electric panel does in that they have a flat solar absorption area. This flat, simplistic design provides affordable pricing and high performance under optimum conditions, but also limits performance in northern climates and locations where freezing temperatures are an issue for much of the year and low solar angles and short days are prevalent during the fall and winter months.

- Key Advantages

- Affordably priced - typically significantly less expensive than evacuated tube solar collectors
- High efficiency and performance in southern, sunny, warm climates all year round
- Highest overall BTU production of any type of Solar Collector for hot water production

- Key Disadvantages

- Limited freeze protection
- Poor performance in cold conditions due to limited freeze protection
- When collector is damaged, or not functioning, the entire system must be shut down and the entire collector replaced.

Evacuated Tube Solar Collectors

are a unique solar collector, with many design features that have never been used before in the solar hot water field. Each collector is a series of vacuum sealed glass tubes that are inserted into a manifold. As the copper heat pipe within the Evacuated Tubes is heated, it transfers its heat upwards, to the condenser, which is seated inside the manifold and heats water or HTF as it passes through the manifold's header pipe. Evacuated Tube Solar Collectors have many key advantages, including:

- Key Advantages

- Affordably Priced, Short Payback Periods and high returns on investment
- Specifically designed to provide maximum performance in colder climates
- Can be used in nearly every climate, including warm climates and cold climates up to -60 Fahrenheit
- Unique design allows system to maintain operation if a tube fails, or is broken. Also, you need only replace damaged tubes, not the entire collector
- Tubes can be replaced while the system is still active

- Key Disadvantages

- Slightly more conspicuous than Flat Plate Solar Collectors
- Typically more expensive than Flat Plate Solar Collectors



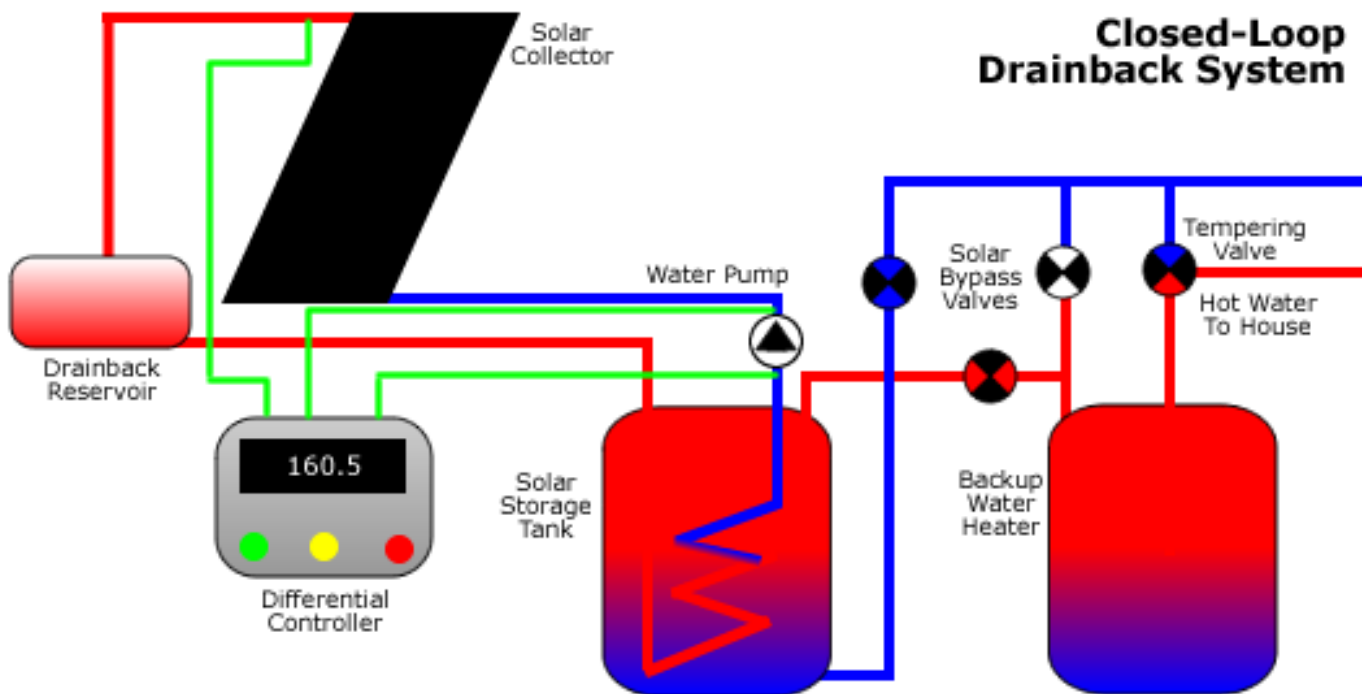
Closed Loop Drainback Systems

First developed in the 1980's, the Closed-Loop Drainback Systems have proven themselves to be reliable and highly efficient. They are essentially a non-pressurized closed-loop system that uses water as a heat transfer fluid (not a glycol mix). A small drainback reservoir is added to the collector loop, and the system is filled pure water to the top of the reservoir. Because the collectors are located above the reservoir, they remain dry when the system's pump(s) is off.

How they work – when the collectors are hotter than the water in the storage tank, the system activates automatically to heat the water. Then, when the water in the storage tank is hotter than the collectors, or reaches a pre-determined cut-off temperature, the system shuts down the pump and the water drains back to the reservoir.

Problems addressed

- Freeze protection gravity based
- The pump is shut down when the water temperature is correct, draining all excess water from the collectors
- Fewer components than other systems, reducing the risk of problems, and lowering any repair or replacement costs

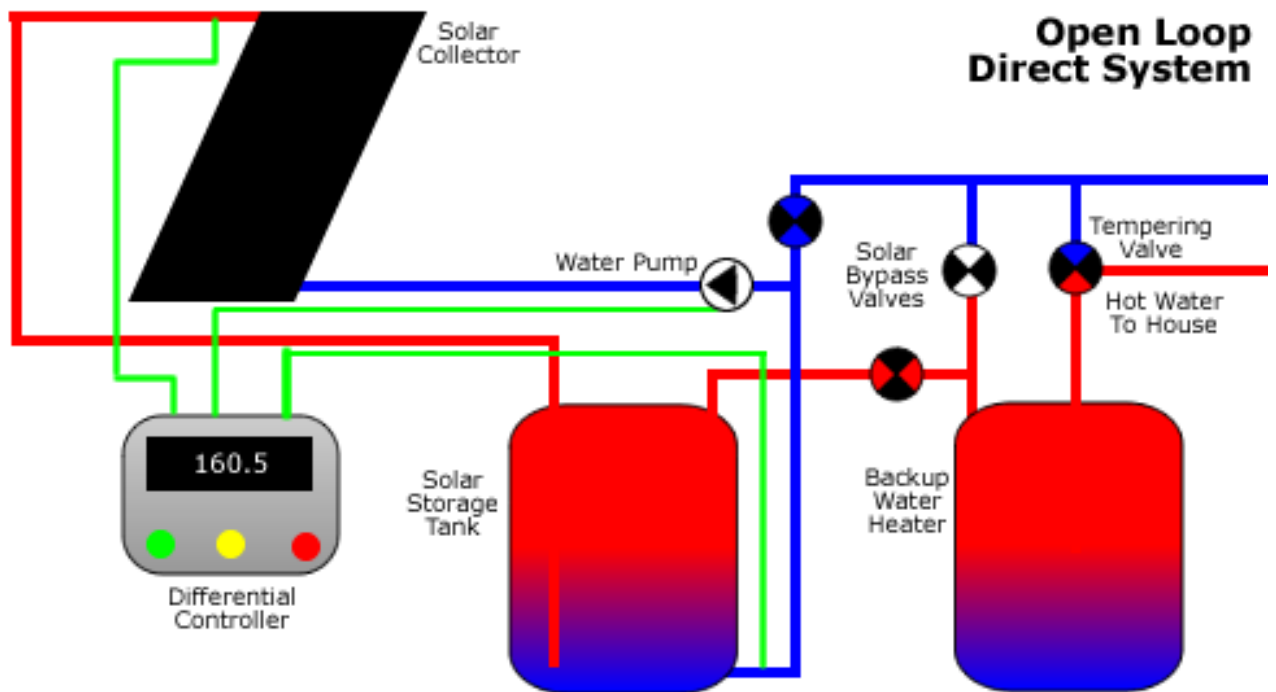


Open Loop Direct Systems

The simplest of all direct systems is the Thermosyphon Water Heater. These systems operate on a very simple principle – water is circulated by natural convection and gravity – rising and falling in response to solar heat, just as air does. In their simplest form, Thermosyphon Systems are not suitable for cold weather climates because water remains in the collector at all times, creating a problem with freezing conditions. However, a valve can be added to drain the collectors when freezing temperatures occur.

A direct pump system is often used as flexibility in system layout and design becomes necessary. With this forced circulation, the tank does not need to be placed above, or even near, the solar collectors. In this system, the pump moves water through the collectors only when there is enough solar radiation to provide useful heat. When the pump shuts off the collectors are drained of water (assuming the drain valve has been installed).

Important Note: Direct systems, whether pumped or thermosyphoning, cannot be used in areas where water is hard or acidic. Scale deposits would quickly clog the inside of the absorber tubing, and the corrosion could render the system inoperable.



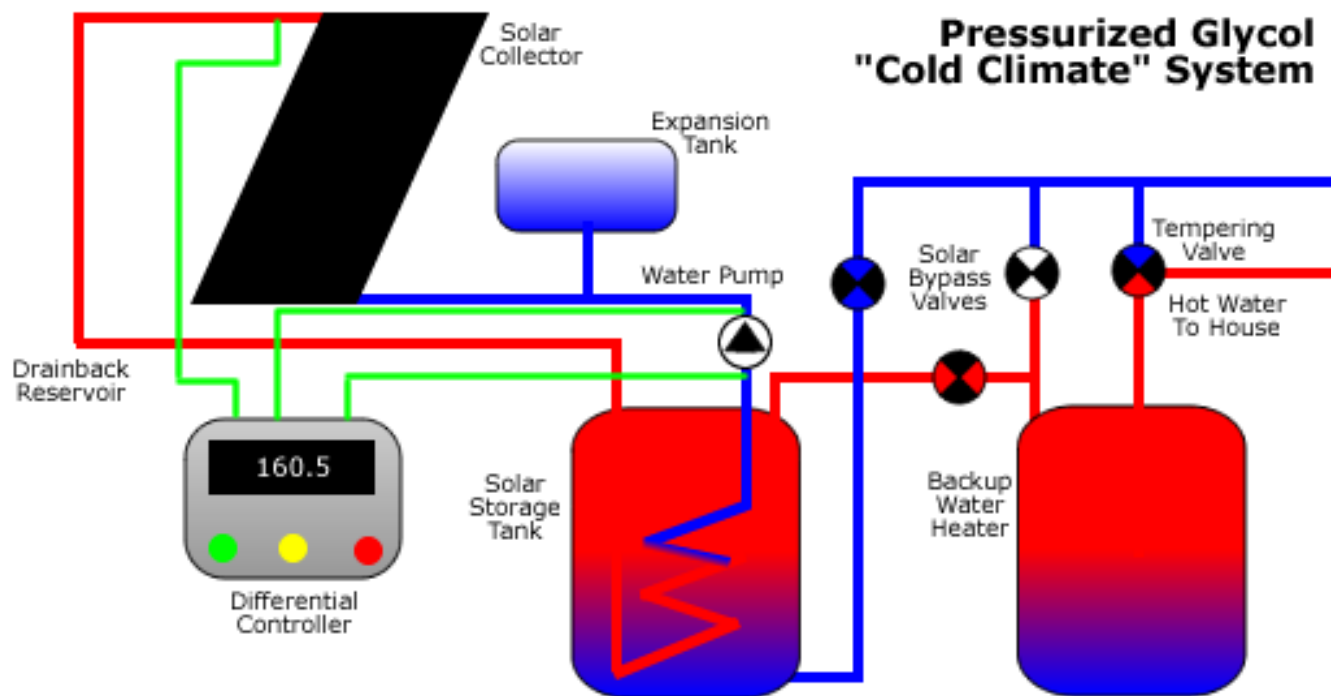
Pressurized Glycol (Cold Weather) Systems

The pressurized glycol system is the most reliable configuration for Solar Water Heaters, but the initial cost in collectors and components, and the costs of maintenance and repair are significantly higher than any other system setup configuration.

If you never want to worry about freezing damages, and are not concerned with providing the lowest initial investment, and getting the fastest possible payback, the pressurized glycol system is the right choice for you. Changing your fluid (a water/glycol solution) regularly is recommended for the protection of your investment, but will modestly raise your maintenance time and costs.

Advantages:

- Will not freeze, except in extreme temperatures
- Uses a pressurized loop that circulates a food-grade glycol
- Indirectly transfers heat from the glycol solution to your potable water
- Requires the glycol solution to be changed every few years (at least)



Notes on Pressurized Glycol Systems

You can use the information below to determine the correct amount of glycol you should use in your pressurized glycol solar hot water system, and which type of glycol should be used. These are important factors in designing and installing your solar hot water system, and ensuring that it continues to operate year round and as efficiently as possible.

Freezing Points for Propylene Glycol based water solutions:

Propylene Glycol Solution (% by mass)		0	10	20	30	40	50	60
Temperature	Fahrenheit	32	26	18	7	-8	-29	-55
	Celsius	0	-3	-8	-14	-22	-34	-48

* Due to slush creation, you should avoid using these solutions close to their freezing points

Recommended % of Volume for Propylene Glycol Solutions:

Temperature (F)	% for Freeze Protection	% for Burst Protection
20	18	12
10	29	20
0	36	24
-10	42	28
-20	46	30
-30	50	33
-40	54	35
-50	57	35
-60	60	35

* SunMaxx, nor the manufacturers of your Propylene Glycol guarantee that freezing damage will not occur at the temperatures listed in these tables.

Other helpful Hints:

- If using a glycol-based HTF, the pH level should be maintained between 8 and 10 to minimize corrosion
- Always use propylene (food-based) glycol. In case of system failure or mixing, serious injury ingestion will be avoided

Sizing Your Solar Hot Water System

Regardless of the application you are using your SunMaxx Solar Hot Water System for, it is extremely important that the system be sized properly in order to provide the most cost-effective operation, shortest payback period and highest overall return on your investment.

One major recommendation is that you always start with a system that is smaller than you need. SunMaxx Solar Hot Water System are plug n play systems, which can have additional solar collectors added in at a future time easily and without hassle. If a large solar hot water system is out of your budgetary range, you should definitely make a smaller initial investment, begin to save money, and upgrade to a larger system down the road. Typically, we recommend that customers start with domestic hot water and then move to solar radiant heating down the road. Of course, this is not a necessary step.



Sizing your Domestic Solar Hot Water System

is relatively easy. The sizing of this system is based mostly on the number of people who live in your home, and the amount of hot water you use in the average day.

- * Typically, the average person uses 20 gallon of hot water per day.\
- * Therefore, a household of 4 people will use roughly 80 gallons of hot water per day

To make sizing your Domestic Solar Hot Water System even easier, SunMaxx offers a number of pre-packaged domestic solar hot water systems, specifically sized to meet the needs of households from 2 to 6 people. If you have a larger household, or use a larger amount of hot water than average, a SunMaxx Specialist, dealer or installer can custom size a system to meet your specific needs.

Sizing your Solar Radiant Heating System

Solar Radiant Heating is one of the best uses of Solar Hot Water Systems today. With the rising prices of heating oil, these systems can save customers hundreds, or thousands, of dollars on your heating bills every year. Generally speaking, these systems are designed and sized to provide appropriate heating in the winter time when heating is more critical. However, this will leave a large amount of excess heat in the summer months.

To counter this excess heat, there are several different methods that you can use:

- Over compensation of the installation angle for limited production in summer months (see the explanation later in this guide
- Cover a number of your solar collectors during the summer months, leaving only enough exposed to produce your domestic hot water needs
- Use a heat dump to rid the system of excess heat. The most cost-effective heat dump is a pool - by using your excess for pool heating in the summer months, you can get excess heat out of the system and put it to use. Additionally, a traditional heat dump can be installed on your system to rid the system of excess heat

SunMaxx offers a number of Pre-Packaged Solar Radiant Heating Systems for homes from 1000 square feet to 2500 square feet in size. These pre-packaged kits can be used in forced hot air, baseboard and in floor heating systems, and a SunMaxx Specialist, Dealer or Installer can assist you in custom sizing a system to meet the heating needs of larger households and office spaces.

Installation Angle & Direction

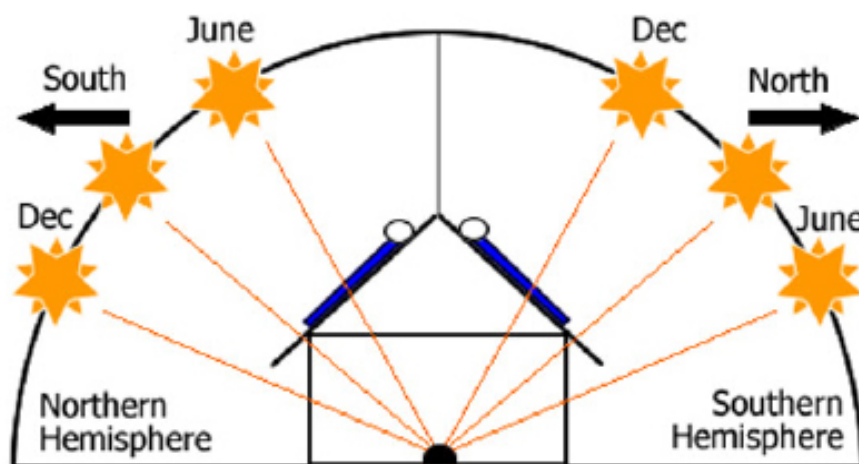
Ensuring that your Solar Hot Water Collectors, whether they are evacuated tubes or flat plates, is vitally important – as much so as sizing your Solar Hot Water System correctly. If you have questions about how you should mount your collectors, the following guide will walk you through the steps in determining the direction and angle at which you should install your new SunMaxx Solar Hot Water Collectors.

For additional information beyond this guide, please contact us.

Your Goal

To make sure that your collectors get as much useable sunlight as possible each and every day of the year.

Direction & Angle of Installation



Direction of Installation

- In the Northern Hemisphere – Collector faces South
- In the Southern Hemisphere – Collector faces North

Optimum direction for Solar Collectors is not magnetic South or North (the readings from a compass) – it is actually True South or True North. The map on the next page of this brochure shows the magnetic declinations for the United States. You can use this map to determine how much off of magnetic South you should mount your Solar Hot Water Collectors for optimum performance.

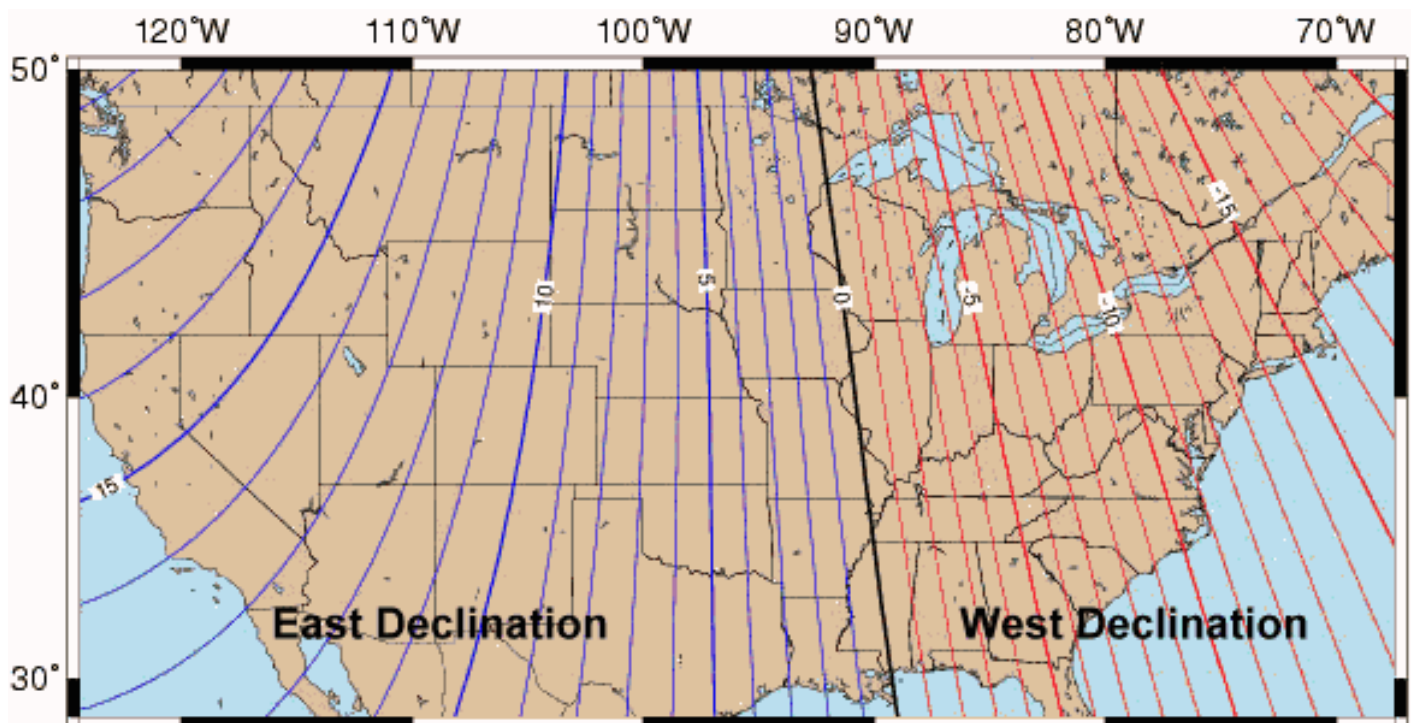
Angle of Installation

As a rule of thumb, your Solar Collectors should be mounted at an angle roughly equal to, or slightly higher than your latitude. In other words, if you are at 35° North Latitude, your solar collectors should be mounted between 30 and 40 degrees for optimum performance. *Also, please note, if your roof is within 10 degrees of the recommended mounting angle for your location, you can get away with flat mounting your collectors as this slight variation in angle will not adversely affect your collector's performance.* in size. These pre-packaged kits can be used in forced hot air, baseboard and in floor heating systems, and a SunMaxx Specialist, Dealer or Installer can assist you in custom sizing a system to meet the heating needs of larger households and office spaces.

Installation Direction - Magnetic Declination

Your Solar Collectors should be installed facing True South. This is different than magnetic south, and the difference between the two is known as magnetic declination. The map above shows the magnetic declinations for most areas across the United States.

Though you should always try to install your Solar Collectors as close to true south as possible, installing them 30 degrees west or east of this mark will not dramatically reduce the efficiency and performance of your solar hot water system.



Installation Angle - Seasonal Compensation

Ensuring that your Solar Hot Water If you have purchased a large solar hot water system because you intend to use it for Radiant Space Heating, or simply to provide a higher solar fraction in your hot water heating, you may find that you have excessive heat in the summertime – which can make your home uncomfortable. There are two simple solutions to this problem; a heat dump, and seasonal compensation installation angles.

A Heat Dump siphons excess heat off of your Solar Hot Water System and dispenses it to exterior source. A Heat Dump can be as simple as using the excess heat for your pool or spa, or you can purchase and install a specialized heat dump which is basically

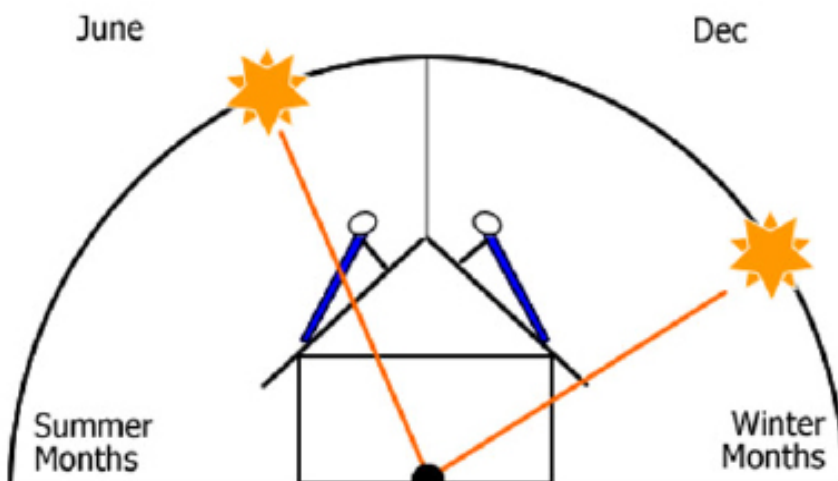
a set of radiators that allows you to dispose of this heat externally to keep your home comfortable.

The Second option is what is known as Season Compensation in your Installation Angle. The nice part about this, in the summer it will lower efficiency to keep your system cooler and your home more comfortable, but in the winter time, the exaggerated angle will increase efficiency providing extra heating capacity from the same number of solar collectors.

- Try mounting your collectors 20-30 degrees higher than recommended by your latitude (i.e., 40-50 degrees instead of 20 degrees)
- In the winter you will get additional performance because the higher angle will put your collectors closer to flush with the sun at its lower winter angles, decreasing the amount of sun that is kicked off by the angle and not absorbed
- In the Summer you will get lower efficiency, and no overheating because the higher angle will increase the kick off of sunlight, and lower the absorption rate

The Image at the top of this page shows this theory in place by comparing the sun's angles and elevations at opposite points of the year.

Seasonal Compensation



Solar Hot Water FAQs

Is solar water heating a viable alternative to gas or electric heating?

Solar should not be seen as an alternative to these heat sources, but rather a supplement. Solar cannot totally replace the need for these sources, as there are times where there is very little, if any sunlight. However, over the course of a year, a correctly sized solar system can provide 60-70% of your household hot water needs. Providing more than this is unadvisable, as too much heat will be generated in the summer.

How long will it take to recoup my investment?

SunMaxx Solar Water Heaters are much more affordable than most other Solar Water Heaters available on the market today. For a household of 4, may not be much more than the cost of a new gas or electric heating system. Depending on your location (solar levels) and current hot water use, the annual gas or electric savings will vary. However, in a normal household that spends 25% of its annual electric bill on water heating, the full cost of the purchase may be recouped as quickly as 4-5 years. There is little doubt that you will save thousands of dollars, or more, over the lifetime of your SunMaxx Solar Water Heater.

Can the SunMaxx Collectors be used in cold weather climates?

Yes. SunMaxx Collectors can be used in temperatures as low as -30 oC, although performance is greatly reduced in such extreme conditions. Good heat output is still achieved in mild, sub-zero conditions.

What happens if one of my Evacuated Tubes is broken?

First, Evacuated Tubes are very tough, and not easily broken. But, if the worst should happen, evacuated tubes can be replaced very easily. They are inexpensive, and available through your local SunMaxx Dealer, or directly from SunMaxx Solar. While waiting for your replacement tube(s), your SunMaxx Evacuated Tube Solar Collector can continue to operate with several broken/missing tubes – however, the system's efficiency will be reduced during this time.

Will water be heated on a cloudy day?

Yes. Although the output of the collector will be reduced on cloudy days, it is still able to provide a significant amount of heating. The cloudier the day, the more that you backup gas or electric heater will be used to maintain the proper temperature in your hot water. This type of automated system ensures that you never run out of hot water, regardless of your weather conditions.

Can I use a SunMaxx Solar Water Heater with my current system?

Normally, yes. Simple retrofit valves can often be used to allow solar to connect to your existing cold water inlet. If your tank cannot accept the solar input directly, an additional storage tank can be installed to pre-heat the cold water prior to entering the existing tank.

Are solar collectors noticeable on my roof?

If only the collector is mounted on the roof they should be mildly inconspicuous. SunMaxx Solar Collectors are designed small and thin, and when flush mounted, look somewhat like a skylight on your roof, not a solar collector.

How do I protect my SunMaxx during sub-zero temperatures?

If you live in an area where sub-zero temperatures occur, and you are planning to install a SunMaxx Solar Water Heater, then you must implement some sort of freeze protection. The easiest way to do this is use a controller that automatically starts the circulation process when the manifold temperature reaches a certain low level – keeping the manifold and system from freezing. Additionally, it is recommended that you install a closed loop system – where your collector loop contains a water-glycol solution separate from your potable water loop.

Will the SunMaxx solar collector be a fire hazard during hot/dry weather?

No. Each component of the SunMaxx Solar Collectors are high-temperature rated and non-flammable, so even during periods of strong sunlight with the pumps off (stagnation), the system will not catch alight or even give off sparks. The majority of components are stainless steel, aluminum glass or glass wool. The manifold outlet should be fitted with a temperature relieve valve, which will prevent the manifold temperature from exceeding 99 oC/212 oF.

Solar Hot Water FAQs - cont.

Can the SunMaxx Collectors heat water to a high-enough temperature?

Yes. In good weather, the SunMaxx Collectors can bring water to their boiling point. Generally speaking, however, this is unnecessary, and the system should be designed to deliver a daily temperature rise of 25-30 oC/45-54 oF. Sizing a domestic solar water heater to bring your cold water up to about 60 oC/141 oC in a single day is not logical because the water is not used for one day – the next day the system will be dumping hot water and heat via the relief valve – this is a tremendous waste of heat and water. Please be sensible when sizing your solar water heater.

What maintenance is required for SunMaxx Solar Collectors?

Under normal conditions and circumstances, no maintenance of the system is required. Due to the unique design of evacuated tube solar collectors, regular rain and windfall should keep them relatively clean and free of debris. If a tube is ever broken, it should be replaced at the earliest convenient time, but the system will continue to operate with this single tube missing (at a lower efficiency, of course).

Can SunMaxx Solar Water Heaters be used for large scale hot water production?

Yes. SunMaxx Collectors can be connected in series or parallel to provide additional water heating capacity as needed. This is particularly effective for schools, apartments, resorts, hotels, offices, and other larger builders. In reality, there is no limit to the amount of hot water the SunMaxx Collectors can produce – simply increase the number of collectors as the hot water demand increases.

Can I heat my swimming pool or spa with SunMaxx Collectors?

SunMaxx Collectors are high-temperature collectors, and are therefore ideal for spas – as the volume of water to be heated is small and the temperature requirements are high. Swimming pools, however, have a much larger volume of water to be heated, and the temperature is relatively low (only a few degrees), which makes SunMaxx Solar Collectors less than ideal for heating pools. We do carry a line of solar collectors designed for heating swimming pools, however.

Are Evacuated Tube Solar Collectors more efficient than Flat Plate Collectors?

This is a very subjective question, and is not easily answered. In some conditions, Evacuated Tube Collectors have a much higher efficiency and cost-effectiveness, however, in other conditions, Flat Plate Collectors are more efficient and cost effective. For additional information on this topic, please see our brochure (Evacuated Tubes vs Flat Plate Collectors).

Can I use SunMaxx Solar Collectors in a drainback system?

Yes. The end port version of the SunMaxx Collector is well suited for drainback use. It is often asked if the solar collector will be damaged when the pump turns off and the system stagnates in good sun – the answer is no, it won't. The system is designed to handle stagnation. You do, however, need to ensure that the insulation on the piping close to the collectors is rated to withstand these stagnation temperatures.