



BIOMASS



GEOTHERMAL



HYDROPOWER



SOLAR



WIND

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At the River Falls Municipal Utility, a Solar Mining Company project (see page 4) includes a solar thermal system that heats water to ensure diesel-electric generators perform to requirements.

The sun's energy has long been used for heating water. In the early 1900s, solar water heating was developed for residences in California and thrived in Florida as well, until delivery of natural gas became cheaper. With increased energy costs in the 1970s, solar water heating technologies reemerged, and have since become both efficient and reliable. Today, Wisconsin businesses that use a large volume of hot water are beginning to discover that active solar systems can be economical for a variety of water-intensive commercial applications.

#### THE BENEFITS OF SOLAR HEATING:

- Solar energy systems produce pollution-free heat for water heating, offsetting other heating fuels and bills.
- Solar thermal energy systems can offer many financial benefits to a business owner. When considered from a cash flow perspective, a business investment in solar water heating can have a positive impact (energy savings > amortized system and maintenance cost). Depending on the application, the return on investment (ROI) for solar thermal systems can be as high as 20 percent.
- One of the most attractive financial benefits of a solar thermal investment is that it insulates your business from future fuel price increases by fixing a portion of annual energy payments.

- Solar water heating systems have been around for a long time and are proven technologies. Modern solar collectors are very durable. With proper installation and maintenance, these systems can last indefinitely. Like any piece of equipment, they do require periodic maintenance. Solar thermal energy systems use standard plumbing and heating components.

- Sunshine is free. As an energy source, it doesn't have to be purchased, mined, refined or transported. The sun is also quite reliable. For six months of the year Wisconsin is mostly sunny, almost every day. The other half of the year is sunny about half of the daylight hours. November and December are the cloudiest months. Because of these seasonal fluctuations, it is not possible to rely on solar energy to provide 100 percent of water heating needs. However, with rising fossil fuel costs, solar thermal energy systems are proving to be a good investment, even in Wisconsin's severe climate.

#### WATER HEATING SYSTEMS

Solar water heating systems are used for both space heating and hot water process applications. The solar water heating technology that works best in Wisconsin's climate is the flat plate collector system. Freezing temperatures do not affect its performance because it is a closed-loop



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system that doesn't heat the water directly. Non-toxic antifreeze is circulated between the solar panels and the stainless steel or copper heat exchanger inside the building's solar storage tank. Heat moves from the solar fluid piping into the potable water.

Businesses that use a high volume of hot water may see a lower monthly bill immediately. The solar water heating applications offering the best payback are those with year round hot water needs. Such applications include:

- Swimming pool heating
- Car washes
- Laundries and laundromats
- Restaurants and bakeries
- Hotels and motels
- Hospitals and clinics
- Meat packing plants and other industries that use a large volume of hot water
- Health clubs, spas, water parks, and campgrounds
- Agricultural applications like process water heating, greenhouse heating, and dairy cleaning

### SYSTEM SIZING

As with any heating system, heating loads are analyzed to determine the appropriately sized solar thermal system. Computer modeling programs are available for these purposes. With a solar thermal system, however, it is also essential to conduct a site assessment to determine whether the building or site offers the proper solar orientation for the equipment. There are solar professionals who can provide this service (see Site Assessment page 3).



**Warm water for the Phoenix Sports Center pool at UW-Green Bay is provided by the Solar Mining Company, Wisconsin's first solar utility (see page 4).**

### Other Considerations:

- Solar thermal systems rarely provide 100 percent of the load, and are often designed to provide around 50 percent. Back-up heating equipment will need to be maintained, but because of the load satisfied by the solar energy system, this back-up equipment's useful life will be greatly extended.
- The biggest site restriction is lack of quality sun exposure. Solar thermal collectors must be mounted to face the south and they must not be shaded between 10 a.m. and 2 p.m. Depending on the application, the tilt angle of the panels could be forty-five or sixty degrees.

## SOLAR ENERGY FOR HEATING AIR



**This 2,300 square foot Solarwall® pre-heats ventilation air for Mary Ann Cofrin Hall, a classroom building of the University of Wisconsin-Green Bay.**

**T**hough not as familiar as water heating systems, solar air heating works well in Wisconsin. These systems are very simple because they employ only one moving part. Air heating is perhaps the most cost effective of any commercial solar technology because of its low initial cost.

Solar air heating typically is used for space heating, and for heating make-up air. Those who use it for make-up air experience especially high returns on their investment. A solar air heating system draws air from either inside or outside the building and heats it in the collector before blowing it into the space to be heated. Air collectors can be wall mounted, roof mounted or ground mounted, depending on the technology used.

Typical solar air heating applications include:

- Warehouses, shops, factories, vehicle maintenance facilities, recreational buildings, hospitals, schools and homes.
- Commercial, agricultural and medical facilities that require high volumes of make-up air.

## A SOLAR WATER HEATING SYSTEM FOR A TYPICAL SMALL COMMERCIAL APPLICATION

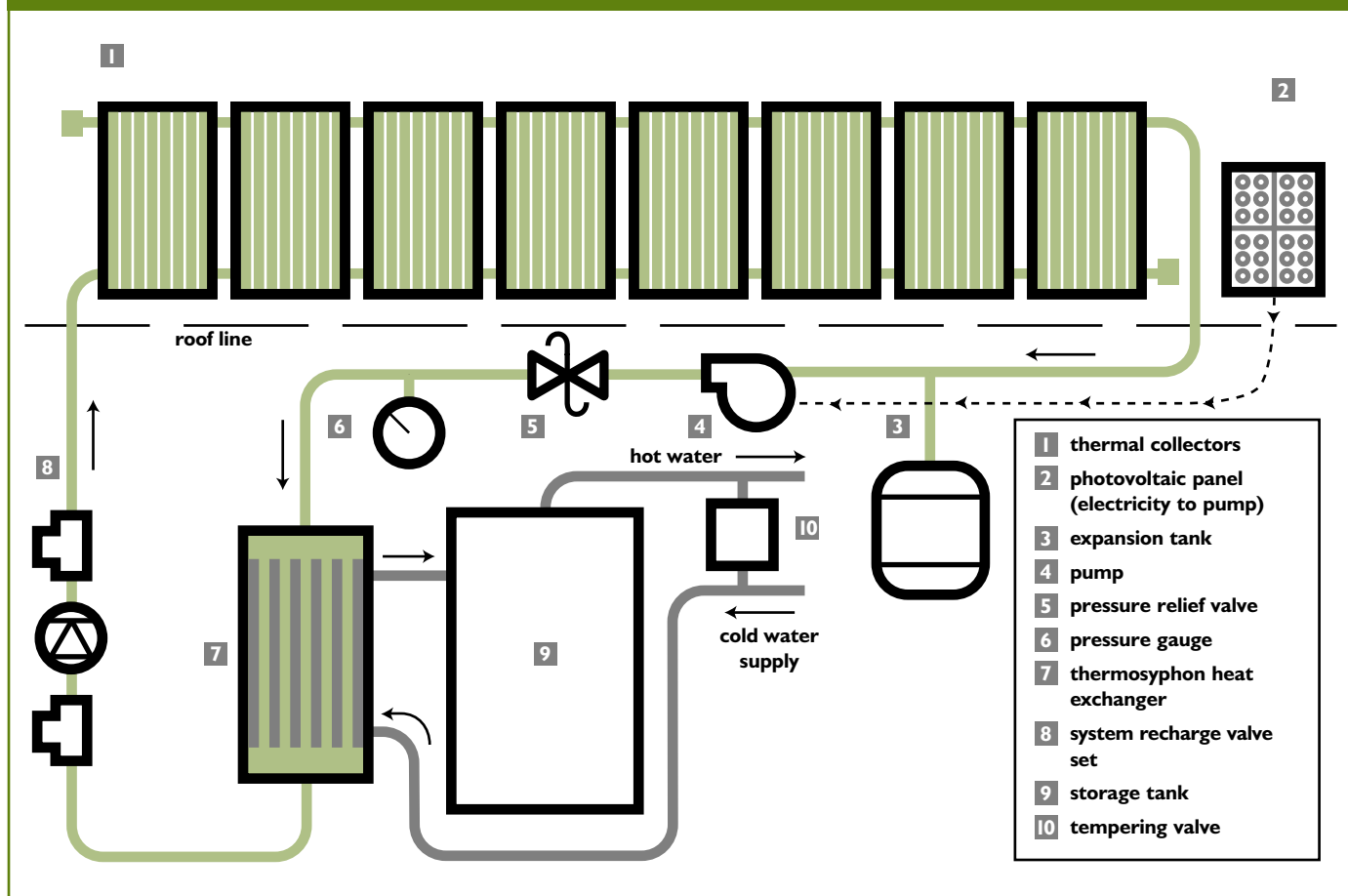


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- For roof-mounted systems, the roof structure must be strong enough to hold a solar array, and the panel array itself must be installed to withstand local wind loads.

- High volume users may also enter into an agreement with a solar thermal utility that will install and maintain a solar thermal system on a business at no cost to your business and then sell heat to the business at a guaranteed rate that is lower than conventional fossil fuel costs.

### SITE ASSESSMENT

The Focus on Energy program offers cost sharing on site assessments that give site-specific information about how a solar thermal energy system can help meet your energy needs. During the site assessment a renewable energy consultant will visit your business to evaluate the site and answer your specific questions. You will also receive a written report of the assessment. Telephone consultation services are offered as well.

### INCENTIVES

Focus on Energy incentives include cash-back rewards and grants for the installation of solar thermal systems, and offers feasibility study



The solar thermal system installed on the Bonduel Car Wash in Bonduel, WI, saves the owners a substantial amount on their energy bill. The solar thermal panels heat water for washing vehicles and for the radiant floor heating system.

grants as well. See [focusonenergy.com](http://focusonenergy.com) for current incentives.

### TAX BENEFITS

A number of federal and state tax benefits are available for those who invest in renewable energy systems. Please contact your tax consultant to see how these benefits can affect your particular business.

### Solar Business Energy Tax Credit (Federal)

The federal business energy tax credit is 10 percent, available to commercial businesses that invest in or purchase solar energy property in the United States.

### Depreciation (Federal)

The new tax code allows qualifying property to be depreciated in any manner that best suits the investor.

### Solar energy equipment property tax exemption (Wisconsin)

This statute exempts taxpayers from any value added by a qualified renewable energy source for property tax purposes.

## WISCONSIN'S FIRST SOLAR UTILITY



**The Solar Mining Company, which received a Focus on Energy grant to get started, began by manufacturing about 400 square feet of solar collectors a day. Each customer gets a system customized to their specific needs.**

**T**he Solar Mining Company, based in Green Bay, wants Wisconsin businesses to know that efficient, affordable solar water heating can save energy and money. This is the first time that solar energy is available as a utility service option.

Using large solar collectors, Solar Mining provides hot water for commercial and institutional users for swimming pools, laundries, hotel shower systems, and other places where hot water is needed. When construction of the solar energy system is complete, Solar Mining Company monitors the energy produced by the solar plant and sells it to the customer. Construction, installation and maintenance of the solar collectors is free and the solar energy is provided for less than fossil fuel energy costs. The company is currently installing a system at a hotel in Green Bay. They also are scheduled to install systems for the Madison School District and UW–Milwaukee.

### MORE INFORMATION

[focusonenergy.com](http://focusonenergy.com)

Contact Focus on Energy to learn more about how a solar water or air heating system might make your business more economical and efficient. Also, learn about other renewable energy technologies and the financial incentives available from the program. Call 800.762.7077 today.

Focus on Energy is a public-private partnership offering energy information and services to energy utility customers throughout Wisconsin. The goals of this program are to encourage energy efficiency and use of renewable energy, enhance the environment, and ensure the future supply of energy for Wisconsin. For information about the Focus on Energy services and programs, call 800.762.7077 or visit [focusonenergy.com](http://focusonenergy.com).