REEVES JOURNAL

Reprint from the October 2011 Issue

ENEREF INSTITUTE CASE STUDY

[FEATURE]

Solar is for CII

Eneref Institute reports on how institutional applications for solar abound in the West

While he was safe and warm at home, Steve McGrail was worried about the warmth of his northern vacation retreat. More specifically, he worried the cabin's continually running propane heaters might both fail at once, putting the house's foundation in danger from underground ice. Adding to his worries, propane was expensive and hard to transport to the cabin.

A solar site survey determined the site had good solar exposure even in winter. He had an array of four Alternate Energy Technologies MSC-32 solar collectors, excellent in wind and snow, installed on a nearby storage shed roof. Designed around the area's absence of electrical power, the system keeps the basement warm, can heat the domestic hot water tank, and can even warm up snow-covered snowmobiles when McGrail's around.

As good as the results are for this and other residential installations, new jobs at commercial, industrial and institutional facilities have lately attracted more attention. That might be because of recent state and federal incentives, in particular, the California Solar Incentive. However, not every state has the same level of statewide solar incentives, but there are still plenty of solar hot spots across the West.

For example, Northern Arizona University in Flagstaff implemented a variety of "green" technologies in its quest for a LEED silver rating for its new Distance Learning Facility. The most obvious of these technologies is a south-facing SolarWall solar air heating system which provides heat during the winter as well as cooling shade in summer.

Conserval Systems, Inc. of Buffalo, N.Y. markets the SolarWall solar air heating system for commercial industrial buildings. This 2,828 sq. ft. unit was designed in such a way that the system becomes one of the key visual features of the wall. It's expected to generate more than 400 million BTU annually and reduce greenhouse gas emissions by 29 tons a year.

In San Antonio, The Army Residence Community, a retirement facility for military officers and their spouses, is saving close to $3,000 a month through solar heating. As Bruce Chittenden, CFO of the Army Residence Community said, "Solar puts us in the driver's seat."

The project began when the facility's residents and owners decided to act to protect the health of the planet. As part of a larger sustainable initiative, in 2009, 178 solar collectors from Apricus, Inc. were installed on the roof of the 14-story apartment building. The system has 12,000 gallons of storage, 600 feet of three-inch copper piping, and a remote monitoring and data acquisition system. The solar system feeds two existing 2.5 MBtu boilers which supply the rest of the facility. At maximum output, the facility generates almost 1.5 MBtu per hour.

Solar air heating system at the Northern Arizona University

The military's interest in solar heating doesn't begin at retirement. Of everything you might expect to find at the 340-square-mile Fort Hood military base, a solar water heater probably isn't at the top of the list. But in 2011, Intelligent Green Solutions, a SunMaxx Solar installer, completed a large solar heating system installation throughout the base. Fort Hood supports multiple units, a corps headquarters and a robust mobilization mission. The installation uses six solar hot water heating systems to meet the domestic hot water needs of five dining halls and a fitness center on the base.

In fact, solar heating is prevalent throughout the U.S. military's facilities. The roofs of the Veteran's Administration Hospitals in San Antonio have 320 SunEarth flat plate collectors gathering sunlight. Working as a subcontractor to Johnson Controls, Inc., Industrial Solar Technology provided design and start-up services, as well as mounting hardware and thermal energy storage tanks ranging in volume from 1,200 to more than 5,000 gallons.

At one of the VA hospitals in San Antonio, the Audie L. Murphy Hospital, four different solar systems were installed. The largest system comprises 75 flat plate panels that preheat domestic hot water for the main hospital building. One of the two new drainback systems preheats feed water for the hospital's main boiler facility.

At the VA hospital in Kerrville, Texas, there is a closed-loop glycol system consisting of 128 solar collectors arranged in 8 parallel rows. Heat from that system helps deliver hot water to a laundry.

The federal government's interest in solar heating crosses over into research facilities. When tasked with building a new Research Support Facility, the National Renewable Energy Laboratory of the U.S. Department of Energy realized an opportunity to showcase the latest renewable and energy-efficient technologies.

The resulting 222,000 square-foot, 800-employee RSF facility is the largest "Net Zero" building in the US. The RSF has a LEED Platinum Plus rating and uses one-third as much energy per square foot as a typical office building.

The SolarWall system by Conserval Engineering, Inc. was integrated into the building's south fa‡ade. Spanning nearly 9,000 square feet, the system pre-heats fresh ventilation air using the sun's energy, thereby reducing heating costs and greenhouse gas emissions.

While solar thermal heating is traditionally used for, well, heat, Los Angeles Valley College is using it to meet both heating and cooling demands in new buildings.

In 2005, the college installed the nation's largest solar heating project, a solar-heating-driven HVAC system. The 350-ton air conditioning and space heating system was designed by SunChiller of California. The system consists of a 35-ton absorption chiller, 500 vacuum tube heat pipe collectors on the roofs of a gym and campus center, and three 24,000-gallon insulated water storage tanks on the ground.

The new installation can provide the estimated campus peak cooling load of 1,500 tons. Ice storage and electric chillers provide backup to the absorption chiller, while boilers act as a backup to the solar hot water tanks that provide space heating. The installation was so successful that in 2010, a similar system was installed at Valley College's sister campus, Los Angeles Pierce College.

The University of Texas, Austin, is also using the sun to cool buildings, though through a somewhat different process. The solar water heating project at the LEED-Gold-certified Norman Hackerman Building serves as a primary source of heat for the building's HVAC dehumidification reheat process and, in cooler months, will supplement building heat.

"We have a strong desire to do this because it enables our campus's Combined Heat and Power Plant to continue to operate at a very high efficiency," said Dan Costello, associate director for facilities maintenance at UT Austin.

The 185 evacuated tube collectors were manufactured by Kingspan Solar and installed by Cinco Solar. It is one of the largest evacuated tube solar thermal systems in the United States. The system supports 256,000 square feet of conditioned space, and has an expected annual production of about two billion BTUs.

Adding to California's roster of innovative projects, in 2010, Toadal Fitness became the first Santa Cruz business to take advantage of the California Solar Initiative incentive program. The 12-panel commercial system manufactured by Free Hot Water will generate an average of over 1,200 therms per year. "This is part of our commitment to being a green business," said Christophe Bellito, one of the owners of Toadal Fitness.

Paul Burrowes, COO of Free Hot Water, noted that solar hot water is often overlooked by businesses that want to make their operations more sustainable. "I hope this installation raises awareness," Burrowes said.

Some of that awareness might come from the Seattle Aquarium. "Seattle might be known as Rain City, but solar works in Seattle," said Seattle City Light Conservation director Bob Balzar. The Aquarium is proving that by reducing its natural gas use through solar heating. Five flat plate collectors from Heliodyne provide roughly 60 percent of hot water needs for the aquarium cafe,, cutting energy costs and offsetting at least 2.5 tons of carbon per year. The panels collect heat and transfer it to water through copper piping connected to a 119-gallon storage tank.

The aquarium's leaders are especially excited about the system's carbon emission reductions, as increased carbon in the oceans poses a huge threat to

marine life. Local contractor A&R Solar installed the high-performance panels, which are fitted with monitoring devices that allow aquarium-goers to watch the system's energy savings and, the Aquarium hopes, gain inspiration for similar changes at home.

Students at the Our Lady of the Lake school of the Seattle Parish don't need to take a field trip to the aquarium to learn about solar heating. They have an example right over their heads, installed by Net Zero Impact. Like at UT Austin, the rooftop system uses solar-thermal tubes from Kingspan Solar products, though a different kind. The company estimates that its new solar-thermal system will save the school ten percent yearly on its utility expenditures and conserve 100 million BTUs of natural gas each year.

Overall, the opportunities in commercial facilities for solar heating and cooling has picked up, especially because of state incentive programs, explains Seth Warren Rose, founder of Eneref Institute. However, says Rose, "with 100 million residential hot water tanks in the US, the residential market potential is enormous and should not be overlooked."

This article is part of an ongoing initiative by Eneref Institute to demonstrate the benefits of solar heating and cooling.
Seth Warren Rose is founder and director of Eneref Institute (www.eneref.org) a non-profit research and advocacy organization that reports regularly on ecologically sensible innovations.