THE ENERGY OBSERVER

Energy Efficiency Information for the Facility Manager

Quarterly Issue – September 2006

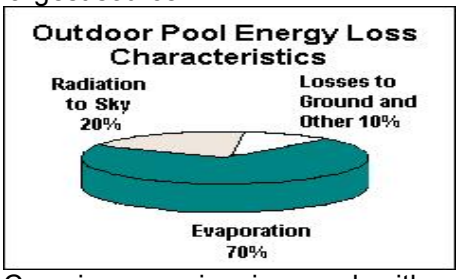
Pool Covers and Solar Heating Systems

The Energy Observer summarizes published material on proven energy technologies and practices, and encourages users to share experiences with generic energy products and services. This quarterly bulletin also identifies informational sources and energy training for facility managers and staff. ***The Energy Observer*** is a service of the **Energy Office, Michigan Department of Labor & Economic Growth.**

This issue of the Energy Observer will explain options to reduce the energy costs associated with heating your facility's swimming pool. A low cost, saving opportunity is presented by implementing daily use of a pool cover. Another option is installing a solar heating system to replace older, less efficient water heaters. Solar heaters and pool covers are environmentally friendly solutions and may be cost-effective measures to explore for your heating needs.

WHY A POOL COVER?

Pools lose heat in an assortment of ways, with evaporation being the largest source.



Covering a swimming pool with a properly designed pool cover is the single most effective means of reducing heating cost. Heating water requires a remarkable amount of energy. It takes one Btu to raise one pound of water one degree, but each evaporated pound of water heated to eighty degrees releases 1,048 Btu's out of the pool. For instance, *every time* you need to raise a 512 ft^3 pool 1° F, it consumes 163,330 Btu's. Translated into cost this amounts to

- **$4.38** using Propane
- **$2.07** using Natural Gas
- **$1.01** using an electric heat pump

Pool Covers conserve water by reducing the amount of evaporation by 95% and depending on the size of your pool typically save replacement water by 30-50%. The need to ventilate indoor air and the use of exhaust fans can also be minimized by reduced evaporation rates, which leads to less energy consumption and greater monetary savings.

Covers also reduce chemical consumption in pools by 35-60% over those without covers. Using a cover when the pool is not in use also reduces cleaning time by keeping dirt and other debris out of the pool and pool filters.

TYPES OF POOL COVERS

There are a few different options when selecting a pool cover.

Bubble or Solar Covers are one of the least expensive covers made for swimming pools. They resemble bubble packing material, but are made from a thicker grade of plastic and have UV inhibitors.

Vinyl Covers are made from a heavier material than bubble covers. They also have a longer life expectancy when they are properly cared for. Vinyl covers can also be insulated with a flexible layer of insulation in-between the two layers of vinyl.

When deciding on which pool cover is best for your facility, you should weigh the cost of labor & equipment against savings to determine the pay back time for your situation.

WHEN TO USE A POOL COVER

If a swimming pool is in use all day a cover should be placed over the pool as soon as it closes and removed right before opening again the next day. Not doing so draws comparison to leaving doors and windows open while the air conditioning is running. For an outdoor pool, it is usually beneficial to have a transparent or bubble cover on for dry or windy climates where evaporation rates increase. In warm or humid conditions where the evaporation rate decreases it is more favorable to leave the cover off during the daylight hours.

SOLAR HEATING SYSTEMS

Solar heating systems are comprised of solar collectors and a fluid transfer system. When implemented, solar heating can provide up to 100% of your pool's heating requirements.

Solar Collectors are flat sheets which have headers at the top and bottom of the panels to supply the fluid to be heated. They can be made from a variety of materials depending on the length of use. If the collectors are to be used only in above freezing temperatures, they can be made of lower costing materials such as thermoplastic

rubber or polypropylene. If used year round under the winter climates of Michigan, collectors can be made from copper absorber plates with low iron tempered glass as a covering. This option allows solar heat as long as the sun is shining, but requires heat exchanges through transfer fluid which will raise a systems cost.

A Fluid Transfer system is also needed in order to use solar energy for heating. The simplest unglazed system will include the pool pump and at least two heat sensors connected to the solar controller. One sensor will be used to measure the temperature on the collector surface while the other the pool temperature. If there is a great enough difference between the two, the controller will send signals to a motorized valve that will direct the pool water through the collector. The pump will automatically switch off when the temperatures approach each other. Each time the water is circulated through the solar collectors it is heated 2-5 degrees. The properly sized solar system can raise a pool's temperature by 10-20 degrees.

WHY CHOOSE SOLAR HEATING SYSTEMS?

All swimming pools require some type of heating either to bring the temperature up to an acceptable level or to maintain it. There are 3 main types of heating systems available: Gas; Heat Pump; and Solar Systems.

Gas systems run on propane or natural gas and normally have the lowest cost of installation but the highest cost of operation. Heat pumps run on electricity and are usually more expensive to install but typically have operating costs 60% to 70% less than that of a gas heater. A solar heating system can be very cost competitive with a conventional heater and have extremely low operating costs since the fuel is free.

Installation involves mounting the solar collectors on a roof or large open area. The general rule of thumb, depending on how long your facility's pool season lasts, is that the solar collector area be 75-100% of the pool area. In some cases, this number can be reduced to 50% if a pool cover is being used.

As a preliminary estimate, a few software programs have been developed to compute both energy and cost savings. Variables such as the size of your pool, estimated implementation cost, and solar resources available are taken into account. When all relevant data is entered, an *estimated* payback time is given. For more details, visit http://energy.sandia.gov/engineeringtools.htm.
Source: Sandia National Laboratories and U.S. Dept. of Energy.

As a comparison, Table 1 lists installation and fuel costs for a standard sized indoor pool using various heating systems.

Table 1-Figures based on 16x32x5 ft pool

Type	Cost & Install	Annual Fuel Cost
Natural Gas or Propane system	$2300-$3000	$500-$1200
Electric System	$3200-$3700	$200-$500
Solar system	$3500-$4000	Free!

Avg. cost of MI utilities taken from the Energy Information Administration

When considering fuel costs, the simple payback period can be as low as 2½ - 3 years. However, you should contact your local supplier to determine the proper specifications and pricing information for your particular heating system.

MORE REASONS TO GO SOLAR

Solar heating systems do not have burners or other moving parts and therefore require little to no maintenance. Gas heaters or heat pumps not only require more maintenance, but they have up to one-third the life span of a solar heating system.

- Solar Heaters (12-15 years)
- Gas heaters (5 years)
- Heat Pumps (10 years)

Rebuild MI Community Partnerships RFP Public and non-profit organizations may submit proposals for grants up to $24,900 to form a Rebuild MI community partnership in their community.

Public Housing Commission Rebuild MI Community Partnerships RFP Public Housing Agencies may submit proposals for grants up to $24,900 to promote & establish with other partners, including other MI Public Housing Commissions, a Rebuild MI community partnership with the State Energy Office.

Proposals for both grants are due September 18th, 2006. To request a copy of the RFP, contact Tom Krupiarz at (517)241-6184 or takrupi@michigan.gov

For a complete list of grants and services, visit: www.michigan.gov/energyoffice

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