U.S. Department of Energy

Tomorrow's Energy Today

for Cities and Counties

Swimming Pools Warm Up to Energy-Saving Technologies

Energy costs for heating swimming pools don't have to drain local government recreation budgets. Using just a few techniques—solar water heating and pool covers, for example—has reduced costs for municipal pools across the country and left more money for other activities.

Heating swimming pools doesn't have to siphon needed funds from already tight budgets. In fact, it's possible to reduce costs for heating swimming pools as much as 50%. A special U.S. Department of Energy (DOE) program shows pool owners and operators how they can achieve these savings.

The program, Reduce Swimming Pool Energy Costs! (RSPEC!), is part of the national effort to reduce energy consumption and air pollution, thus protecting the environment. It's a partnership between the public sector and private industry to promote the use of energy-efficient products to owners and operators of institutional, commercial, and residential pools.

RSPEC! recommends ways to lower operating expenses for swimming pools. For example, the program advocates the use of swimming pool covers, which significantly reduces heat loss caused by evaporation. The program encourages the use of several other technologies for pools and pool facilities because of their potential to save energy:

- Solar pool-heating systems
- High-efficiency conventional pool-heating systems
- Energy-efficient pumps and motors
- High-efficiency compact fluorescent lights.

In 1985, the city of Englewood, Colorado, paired two of these energy-saving technologies—a semiautomatic pool cover and flat-plate collectors for solar water heating—as part of an energy-efficient design for the Englewood Recreation Center. Including these features has enabled the center to save energy and money, while providing services expected by the community.

Rob Bartee, © Bartee Photography 1995 / PIX1656

The Englewood Recreation Center pool in Englewood, Colorado, offers water fun for members of the community. Seniors enjoy both the benefits of water aerobics and an energy-efficient pool.

"This project is good for the school, good for solar energy, good for the environment, and good for the economy."

—Frank McLaughlin
Owner
All Quality Solar Systems

Ashland, Missouri, realized a different benefit when a solar water-heating system and a pool cover were added to the community pool—more patrons. Before the solar system was installed, few residents opted to try the pool's chilly waters. A lack of customers led to low revenue, which meant less money was available to pay off the original pool loan. Using a conventional heating system was cost prohibitive for the community.

So a local resident submitted a proposal to the Missouri Department of Natural Resources requesting a grant to purchase a solar system to heat the pool. The proposal was financed with oil overcharge funds of $10,000. Today, paying customers flock to the warm waters of the Ashland Community Pool.

The Culprit Who Snatches Heat from the Swimming Pool

Evaporation accounts for almost 70% of the energy lost in both indoor and outdoor pools. The reason that evaporation has such an impact is that evaporating water requires tremendous amounts of energy. Raising 1 pound of water 1°F takes 1 Btu (raising .45 kilograms of water 1.7°C takes .3 Watt-hours). However, each pound of 80°F (27°C) water that evaporates removes 1048 Btu (307 Watt-hours) of heat from the pool.

The Reduce Swimming Pool Energy Costs! (RSPEC!) program suggests using pool covers on indoor and outdoor pools to decrease evaporation when the pool is closed. Covering pools when they're not in use can reduce heating costs 50% to 70%. Pool covers provide other benefits. They reduce chemical use and cut cleaning time by preventing dirt and debris from falling into the pool.

Several types of pool covers are available: bubble, vinyl, insulated vinyl, and plastic. They range from fully automated, which operate with the flick of a button, to manual, which require human labor to put on and take off the cover. The complete costs associated with each type of pool cover should be used to determine which is best for a specific location.

Rob Bartee, © Bartee Photography 1995 / PIX1655

These pool covers at Skyland Recreation Center in Denver, Colorado, reduce energy costs by almost $10,000 annually. The pool covers help retain thermal energy in heated swimming pools.

Installing windbreaks is another option for reducing evaporation around outdoor pools while the pool is open. Energy use skyrockets 300% with just a 7-mile-per-hour (11-kilometer-per-hour) wind on the pool surface. Adding trees, shrubs, fences, or other windbreaks diminishes the effect of wind on pool temperature.

To learn more about minimizing the effects of evaporation, contact RSPEC!, U.S. Department of Energy, Denver Support Office, 2801 Youngfield Street, Suite 380, Golden, CO 80401, (303) 231-5750.

Using techniques and materials advocated under RSPEC!, decision makers responsible for swimming pools can bring operating costs down, leaving funds for other resources. This is good news for recreation budgets, which are often among the first slashed when money is tight.

RSPEC! is gaining momentum in cities and counties across the country because of its straightforward, mix-and-match recommendations. Some publicly held pools, including the one described below, are trying at least one of the RSPEC! technologies.

Wading in RSPEC! Waters

After attending one RSPEC! workshop, Jocelyn deLaine, the Energy Project Manager for District of Columbia Public Schools was convinced. "They showed us the statistics. We were losing a lot of energy and a lot of heat. So we decided to do a pilot project under the RSPEC! program," says deLaine.

The pilot project, located at Marie Reed Elementary School, involves installing a solar system to heat the school's 3500-square-foot (325-square-meter) swimming pool. Although all public schools in the District of Columbia have indoor pools, the pool at Marie Reed is the only one heated with an all-electric system. Public school officials picked Marie Reed for the test project because this school uses more energy to heat the pool than others in the district.

The solar system will help to heat the pool from April through October; electricity will be used during the other months of the year. From April through October 1994, the school spent about $20,000 for electricity to heat the swimming pool. With the solar heating system, energy costs are expected to drop about 50% during April through October of each year.

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These flat-plate collectors are used to heat water at the indoor pool of the city of Englewood, Colorado. The city has coupled the roof-mounted collectors with semi-automatic pool covers to save on energy costs.

The usual payback period for this type of solar pool heating system is a quick 3.5 years.

Another big component of the project is educational outreach—to students and to the community. Some of the students will study solar energy in the classroom as part of the project. Sixth graders will calculate the monthly energy consumption of the pool for 1 year. A display board in the pool area lobby will show parents and other visitors how the solar heating system works.

This project is the result of a partnership among District of Columbia Public Schools; All Quality Solar Systems, a solar heating manufacturer; The Solar Center, the installing contractor; Potomac Electric Power Company, the local utility; and DOE.

Solar water-heating equipment and installation costs vary, based on the size of the pool. Because the Marie Reed pool is so large, the combined cost of the equipment and the installation would be about $40,000. However, the manufacturer is donating the equipment, and the utility is paying the installation cost. Even if Marie Reed had purchased everything outright, though, the simple payback period on the system would be 4 years, given the 50% energy-saving projections. If energy costs fall as projected for Marie Reed, the D.C. public school system plans to purchase and install similar technology in 10 other schools with swimming pools.

A similar project on a 500-square-foot (46-square-meter) pool would range in cost from $1,800 to $2,400, according to Frank McLaughlin, owner of All Quality Solar Systems. McLaughlin says he decided to donate the equipment to Marie Reed because "This project is good for the school, good for solar energy, good for the environment, and good for the economy."

McLaughlin is also impressed that the school will include solar energy in its curriculum. "I originally became interested in solar energy in junior high. I sustained that interest through high school and college. My company's position is that if students can see a project of this magnitude now, they'll be more apt to be proactive about solar energy in the future," explains McLaughlin. "And by doing the calculations, they'll see that solar energy is good for the environment and the country. It's a win-win situation."

The Marie Reed pool, which holds 165,000 gallons (625,000 liters) of water, is open year round. It's used primarily as recreation for neighborhood residents, particularly senior citizens, and secondarily for student physical education classes.

Uncovering Savings with Pool Covers

Indoor swimming pools must be continuously heated to maintain comfortable and healthy temperatures. But heated swimming pools lose much of their thermal energy because of evaporation (see *The Culprit Who Snatches Heat from the Swimming Pool*, p. 2). According to RSPEC!, one way to prevent this heat loss is to use pool covers when the pool is closed.

That's what the city of Denver, Colorado, is doing at the Skyland Recreation Center. The Skyland pool is closed 12 hours each day. Those hours provide a prime opportunity for energy savings.

In April 1995, Löf Energy Systems installed two motorized and two manual pool covers on the 4724-square-foot (434-square-meter) indoor pool, which uses natural gas heating. With the covers, energy costs will run about $3,500 annually; without them, energy costs would be about $13,200 each year. At a cost of $34,800, the pool covers provide a simple payback of 3.6 years.

Even though the covers are providing substantial savings to Denver, they didn't cost the city a dime, because Löf Energy Systems did the installation. The company had received a DOE grant to improve its pool covers and make them more versatile and reliable. As part of the grant, Lof was required to install one pool cover and monitor its performance.

Owner George Löf says that the company selected Skyland because of its size, location, and lack of obstructions such as diving boards.

This project involved the U.S. Department of Energy, which provided funding; Löf Energy Systems, which manufactured and installed the pool covers; Public Service Company of Colorado, which offered the use of gas-metering facilities for measurement; and the city of Denver.

Getting the Word Out

Through a series of fact sheets, a 12-minute video, a software package, DOE staff presentations, and technical assistance, RSPEC! provides swimming pool owners and operators with information to determine which cost-reduction measures are best for their location.

When owners and operators decide to use RSPEC! methods to reduce pool heating costs, the first step is to determine where energy dollars are going. Pool owners and operators need to thoroughly analyze individual pool energy requirements. A special software package—*Energy Smart Pools*—makes the analysis less tedious than did previous software. For those who would rather not use the software, the program supplies a worksheet for the analysis. Many of the RSPEC! resources can also be found on the Internet. Access the Energy Efficiency and Renewable Energy Network at http://www.eren.doe.gov., (1) click on "Finding Energy Information Resources," (2) click on "Keyword Search of EREN," (3) key in "RSPEC" and press ENTER, (4) click on "5. Description: RSPEC: Reduce Swimming Pool Energy Costs."

RSPEC! reaches out to owners and operators of all types of pools. To spread the message about efficient heating for swimming pools, DOE has joined forces with national pool associations, manufacturers of pool energy management equipment and systems, and dealers and distributors to implement energy efficiency and renewable energy technologies in the industry.

Conclusion

For swimming pool owners and operators who struggle to keep down costs, RSPEC! provides a way out of unnecessarily high utility bills. By making a few improvements, owners and operators of publicly held pools can make sure swimmers and taxpayers alike get what they expect from public swimming facilities. ■

For More Information

Florida Solar Energy Center
1679 Clear Lake Road
Cocoa, FL 32922
(407) 638-1000
Fax (407) 638-1010
FSEC provides fact sheets that describe technologies available to make swimming pool heating more energy efficient.

Jocelyn deLaine
Facilities Management
District of Columbia Public Schools
1709 Third Street NE, Third Floor
Washington, DC 20002
(202) 576-7718
Ms. deLaine can provide input on the Marie Reed Elementary School swimming pool project.

Solar Energy Industries Association
122 C Street, NW, Fourth Floor
Washington, DC 20001
(202) 383-2600
Fax (202) 383-2670
SEIA has state offices throughout the nation that can provide information about solar-energy-related projects for swimming pools.

Energy Efficiency and Renewable Energy Clearinghouse
P.O. Box 3048
Merrifield, VA 22116
(800) 363-3732
EREC, funded by the U.S. Department of Energy, provides information on renewable energy and energy efficiency technologies.

National Spa and Pool Institute
2111 Eisenhower Avenue
Alexandria, VA 22314
(703) 838-0083

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Mr. Jones can provide information about the RSPEC! program and the materials available through the program.

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