SWIMMING POOLS

Introduction

The proper selection, installation and operation of the pump, filter, heating system and cover are among some of the most important factors contributing to increased efficiency of a swimming pool.

What about pool pumps?

You can reduce energy consumption and maintain a comfortable swimming pool temperature by using a smaller, higher efficiency pump and by operating it less. In a study of 120 pools by the Center for Energy Conservation at Florida Atlantic University, some pool owners reduced their original pumping bill as much as 75% when they used the energy conservation measures listed in Table 1.

Table 1. Pump Energy Consumption Conservation Measures

Condition	Energy Use (kWh/year)	Cost of Energy ($/year)	Energy Reduction
Original	3000	240	—
Pump replacement (downsizing)	1800	140	40%
Reduced time (60%)	1200	100	60%
Combination of above	720	60	75%

Table courtesy of Home Energy *magazine, via DOE/EERE.*
Available online at http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13290

These reductions represent a typical pool in Florida using energy at 8 cents per kWh. Due to Florida's long swimming season, the average pool pump energy bill is probably higher than in many other areas of the country. Note that by both downsizing the pump *and* reducing operating time, you can achieve even greater energy reductions.

Sizing the pump

The larger the pump, the greater your pumping and maintenance costs. Therefore, for increased efficiency, select the smallest size pump possible for your swimming pool. The Florida Solar Energy Center has stated that a pump no larger than ½ hp per 10,000 gallons of pool volume should be adequate for most situations. To choose the right size pump, consult a pool supplier's design chart. When using the chart, match the hydraulic characteristics of the pump to both the piping and the pool's flow characteristics. Note that if using a solar pool heating system, you also need to consider the need to pump the pool's water to and through the collector(s).

If you decrease the pool circulation system's hydraulic resistance, smaller pumps (that cost less) can be used by:

- Substituting a large filter (rated to at least 50% higher than the pool's design flow rate).
- Increasing the diameter (to generally 2" PVC piping rather than the standard 1½") or decreasing the length of the pipes, or replacing abrupt 90-degree elbow pipes with 45-degree ones or flexible pipes.
- You can reduce the pump's electricity use by up to 40% by decreasing the pool circulation system's hydraulic resistance.

Operating the pump

Pool pumps often run much longer than necessary to mix chemicals and remove debris. As long as the water circulates while chemicals are added, they should remain evenly mixed. In addition, depending on pool location (i.e., near trees or some other source that generates water quality issues), it may not be necessary to recirculate the water every day to remove debris, and most debris can be removed using a skimmer or vacuum. In addition, it's worth noting that longer circulation doesn't necessarily reduce the growth of algae.

What about filtration?

Filtering is a major cost of owning a swimming pool. Try reducing your filtration time to 6 hours per day. If the water does not appear clean, increase the time in half-hour increments until it does. In the study cited earlier, most people who reduced pumping to less than 3 hours per day were still happy with the water's quality. On average, this reduced the electricity demand for pumping by 60%.

Programmable timers can be set to control the pump's cycling. If debris is a problem, use a timer that can activate the pump for many short periods each day. Running the pump continuously for—say—3 hours leaves the other 21 hours a day for the pool to collect debris, whereas several short cycles can keep the pool clean all day. Check with the local utility company as to what times they suggest are the best off-peak hours in your area.

Note: If you use the services of a maintenance staff, make sure that they do not change the timer's settings.

Keep the intake grates clear of debris. Clogged drains require the pump to work harder, which uses more energy. Clean your filter according to the manufacturer's recommendations. Sometimes the operating sound of the pump changes and is detectable when it is operating under more strain.

Note that in addition to chlorine, which is often used to maintain sanitary swimming conditions, a number of alternatives are now on the market. Be sure to check them out with regard to your particular pool and location.

What about pool heating?

Options for heating the pool include solar energy, fossil fuels (LP gas, natural gas or oil), and heat pumps. Each option has its own advantages and disadvantages. Solar pool heating is the most cost-effective use of solar energy in Florida.

Solar Pool Heater

A solar pool heating system usually costs between $3,000 and $4,000 to buy and install. They typically last longer than gas and heat pump pool heaters. Your actual cost and payback depend on many factors; check with your local utility company to see if they offer rebates.

Gas Pool Heater

A gas pool heater is most efficient when heating a pool for short periods of time, and is ideal for quickly heating pools. Therefore, gas pool heaters can be a good choice for pools that are not used on a regular basis. Unlike heat pump and solar pool heaters, gas pool heaters can maintain any desired temperature regardless of the weather or climate.

Heat Pump Pool Heater

Heat pumps do not generate heat; they use electricity to capture heat and move it from one place to another. Heat pump pool heaters generally cost more than gas pool heaters, but they typically have much lower annual operating costs because of their higher efficiencies. With proper maintenance, heat pump pool heaters typically last longer than gas pool heaters.

What about pool covers?

Covering a pool when it is not in use is the single most effective means of reducing the pool's heating costs, by as much as 50%–70%. Pool covers not only decrease pool heating costs, they also can minimize the pool's chemical use by 35%-60%, conserve water by reducing the amount of make-up water needed by 30%-50%, and reduce cleaning time by keeping dirt and other debris out of the pool. When choosing a cover, look for durability, ease of taking on and off, price, warranty, material transparency, insulation value, storage need, and safety.

For more information, please contact your professional pool dealer to help you make informed choices on all aspects of your pool's operation.

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Author: Wendell A. Porter, Assistant Research Scientist, Department of Agricultural and Biological Engineering, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611. First published May 2009.

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About the Florida Energy Systems Consortium (FESC)

The goal of the consortium is to become a world leader in energy research, education, technology, and energy systems analysis. Specific goals include:

- Coordinate and initiate collaborative interdisciplinary energy research among the universities and the energy industry.
- Share research results with a wide audience, including the science community, media, business, governments, and industry.
- Assist in the creation and development of a Florida-based energy technology industry.
- Provide a state resource for objective energy systems analysis.
- Develop education and outreach programs to prepare a qualified energy workforce and informed public.

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