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**Home Swimming Pools and Energy Efficiency: How Pool
Owners and the Government Can Promote Long-Term
Sustainable Use of Limited Energy Resources in The
Tampa Bay Area**

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Home Swimming Pools and Energy Efficiency: How Pool Owners and the Government Can Promote Long-Term Sustainable Use of Limited Energy Resources in the Tampa Bay Area

Bolstering of government and private subsidies for efficient swimming pool equipment would greatly enhance sustainable energy use by encouraging pool owners to install more energy-efficient equipment in their pools. Currently few federal, state, or local government incentives exist to promote energy-efficient upgrades for private swimming pools in the Tampa Bay area, although providing such incentives would likely decrease the power consumption of such pools to a substantial degree and promote long-term sustainability of energy resources.

Swimming pools play a major role in the daily lives of many Floridians. A 2006 estimate by the Florida Department of Health determined that approximately 1.1 million residential swimming pools existed in Florida.¹ Approximately seventy-two thousand of those are in Hillsborough County, while Pinellas County has over sixty-five thousand pools, Manatee County has over twenty-six thousand pools, and Sarasota County has approximately forty-five thousand pools.² With such a large number of swimming pools in the Tampa Bay area, the amount of electricity and chemicals required to clean and maintain all of them is substantial. Swimming pools require chlorine or other chemicals to kill microorganisms, pumps and filters to remove dirt and other debris,³ and possibly a heater to keep the water temperature comfortable throughout the swimming season.⁴ All of these pool necessities require energy and money to keep pools functional. For this reason pools should

¹ Kristal Hall and Michael Lo, Office of Injury Prevention, Florida Department of Health, *Survey of Residential Swimming Pools Assessed by Florida County Property Appraisers, Summer of 2006*, <http://www.consensus.fsu.edu/FBC/Pool-Efficiency/ResidentialSwimmingPoolSurvey.pdf> (Oct. 2006).

² *Id.*

³ Centers for Disease Control and Prevention, *Healthy Housing Reference Manual- Chapter 14: Residential Swimming Pools and Spas*, <http://www.cdc.gov/nceh/publications/books/housing/cha14.htm> (last updated Dec. 8, 2009).

⁴ U.S. Dept. of Energy, *Managing Swimming Pool Water Temperature for Energy Efficiency*, http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13300 (last updated Feb. 24, 2009).

use efficient equipment to minimize their environmental impact and contribute to a more sustainable manner of living.

Energy Requirements of Pools and Potential Savings

Pool Filters

Essential to any swimming pool is a filter. While pool filter designs and specifications vary considerably, the basic principles are the same: a pump mechanism circulates the water in the pool, creating a steady flow through the filter.⁵ To reach the filter, the water typically is pulled into a drain at the bottom of the pool or through a skimmer at the top of the pool, through a sophisticated system of pipes, and to the filter itself, after which water is returned to the pool.⁶ The filter traps any particulate matter suspended in the water, ranging from microscopic particles and bacteria to leaves and other larger debris.⁷ In order to create flow to force water through the filtration system, a motorized pump is required to either push or suck the water toward the drains and skimmers.⁸

While the average household in the Florida uses 1120 kilowatt-hours (kWh) of electricity per month,⁹ a survey of pools in Florida indicated that original swimming pool pumps use an average of 3000 kWh per year, or 250 kWh per month.¹⁰ Thus, homes with pools may use over 20% of their energy consumption on pool filtration. However, with pump replacement and reduced running time, the energy consumption can be reduced to 60 kWh per month, for over 75% total reduction in

⁵ HowStuffWorks, Inc., *How Swimming Pools Work*, <http://home.howstuffworks.com/swimming-pool.htm> (accessed Sept. 6, 2010).

⁶ *Id.*

⁷ *Id.*

⁸ *Id.*

⁹ U.S. Energy Efficiency Administration, *Frequently Asked Questions: Electricity*, http://www.eia.doe.gov/ask/electricity_faqs.asp#electricity_use_home (last updated Mar. 29, 2010).

¹⁰ U.S. Dept. of Energy, *Installing and Operating a Swimming Pool Pump for Energy Efficiency*, http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13290 (last updated Feb. 24, 2009).

pump power consumption.¹¹ This translates to reducing the cost from \$240 per year to \$60 per year.¹²

Energy savings are possible because newer pumps do not run constantly, unlike their older counterparts. The average home swimming pool does not need a pump that operates for more than six hours a day to keep the pool clean.¹³ Newer models of pumps include variable operating speeds that can be adjusted to shut down or decrease power consumption and flow when the pool is clean or not being used.¹⁴ To eliminate the need for extra monitoring, integrated controllers are available on some models that automatically activate the pump at desired intervals.¹⁵

Home owners with older pools should strongly consider replacing the entire filtration system, including the pipes, drains, and skimmers that channel water through the filter. The efficiency of a filtration system is not merely dependant on the motor that drives it, but by the size and layout of the pipes that channel the water, the location and size of the drains leading to the filter, and the effectiveness of the skimmers that channel surface water to and from the filter.¹⁶

Pool Heaters

Heaters are common pool accessories used to extend the yearly swimming season and to make pools more comfortable. Modern pool heaters come in three basic varieties: gas-powered heaters, heat pumps, and solar-powered heaters.¹⁷ Each has its own advantages and disadvantages depending upon the climate they are used in.

¹¹ *Id.*

¹² *Id.*

¹³ *Id.*

¹⁴ Gainesville Regional Utility, *Pool Pump Requirements*, <http://www.gru.com/YourHome/Conservation/Energy/Rebates/poolPumpReq.jsp> (last accessed Sep. 29, 2010).

¹⁵ *Id.*

¹⁶ Manny Garcia, *Energy Savings Technology: Swimming Pool Circulating Systems-The Blue Whale Skimmer* at 4-12 (2009).

¹⁷ U.S. Dept. of Energy, *Swimming Pool Heaters*, http://www.energysavers.gov/your_home/water_heating/index.cfm?mytopic=13150 (last updated Feb. 24, 2009).

Gas-powered heaters, the most common type, transfer the heat generated by natural gas combustion to the pool water traveling through the filtration system.¹⁸ Gas heaters can operate independent of the weather or temperature and are therefore a good choice for colder and less sunny climates.¹⁹ They are also the best for heating a pool quickly, and so gas heaters can be turned off until shortly before the pool is used.²⁰

Heat pumps are more complicated, and rely on the laws of thermodynamics to operate. Essentially, they work like a refrigerator, except instead of forcing heat out, the heat pump draws warmth in from the surrounding air.²¹ The system sucks in ambient air, transferring the heat energy in the air to a liquid refrigerant along the way.²² The heat causes the refrigerant to evaporate, which in turn forces the gas into a compressor.²³ The compressor squeezes the gas so that it takes up less volume, causing it to become much warmer.²⁴ This heated gas then travels into a condenser, transferring the heat to the pool water.²⁵ Because heat pumps use the ambient air as a source of heat, they are more efficient and cost-effective in warmer weather.²⁶ Heat pumps are more expensive than gas heaters, but are more efficient and less expensive to operate.²⁷

Solar heaters, as the name suggests, harness the power of the sun to heat pools. As water passes through the filtration system, some of it is diverted to solar collectors, which absorb the sun's rays and transfer the collected heat to the passing water.²⁸ If used in freezing weather the collectors will require a special glazed coating to prevent damage, increasing the costs for such heaters.²⁹ Even so, solar heaters are

¹⁸ *Id.* at http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13160.

¹⁹ *Id.*

²⁰ *Id.*

²¹ *Id.*

²² *Id.* at http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13200.

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.* at http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13230.

²⁹ *Id.*

generally the most cost-effective and efficient type of pool heater on the market.³⁰ Although the installation costs are higher, the advantage of not requiring external fuel or electricity means that the solar heater will pay for itself within seven years.³¹ Some estimates for Florida pools claim that a solar heater can pay for itself in two years or less, depending on what kind of heater it is replacing.³² Solar heaters also last longer than gas heaters or heat pumps and can also provide hot water to the rest of the house with the appropriate modifications.³³

In Florida, the warm, sunny weather can allow the swimming season to last all year with the help of a pool heater. Ideal pool temperatures range from 78°F-82°F, depending on the age and physical fitness of the user.³⁴ While the warm Florida sun would likely prevent the need for using a heater for most of the year, the cost of maintaining a comfortable water temperature through the winter can be substantial: maintaining a temperature of 78°F year-round in Miami with a heat pump would cost on average \$1100, and to keep it at 82°F, the price would reach \$1845.³⁵ The costs of using a gas heater would be even higher.³⁶ Because solar heaters provide their own energy, they have no operating costs at all, except for the price of maintenance, which should not be required for ten to twenty years.³⁷

Pool Covers

³⁰ *Id.*

³¹ *Id.*

³² Florida Solar Energy Center, *Sizing and Economics*, http://www.fsec.ucf.edu/en/consumer/solar_hot_water/pools/sizing.htm (last accessed Oct. 4, 2010).

³³ *Supra* n. 29.

³⁴ U.S. Department of Energy, *Managing Swimming Pool Water Temperature for Energy Efficiency*, http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13300 (last updated Feb. 24, 2009).

³⁵ U.S. Department of Energy, *Estimating Heat Pump Swimming Pool Heater Costs and Savings*, http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13220 (last updated Mar. 24, 2009).

³⁶ *Id.*

³⁷ *Supra* n. 28.

The use of a cover can dramatically reduce the cost of heating a pool.³⁸ With a cover the same pool in Miami would cost about \$215 to keep at 72°F, and \$410 to keep at 82°F.³⁹ While pools absorb a great deal of heat from the sun, removing the cover on sunny days and replacing the cover at night and during inclement weather can still curtail upwards of 70% of energy loss.⁴⁰ Another advantage to using a pool cover is that it inhibits the evaporation of water, chlorine, and other chemical additives, cutting down on replacement costs and pollution, and in the case of indoor pools, reducing the need for constant ventilation.⁴¹ Pool covers also save energy by keeping out dust and other debris, reducing the time a pump must be used to filter the water and thus increasing savings.⁴² Covers come in a variety of materials and transparencies that affect the durability of the cover and the deflection of solar energy.⁴³ Bubble covers are less expensive than vinyl covers but are also less durable.⁴⁴ Covers may be attached to motors that automatically pull the cover on at night and off during the day to take full advantage of energy provided by the sun's rays.⁴⁵

The Energy Star Program

In 1992 Congress passed into law the Energy Star program to promote the use of energy efficient products for businesses and households.⁴⁶ Energy Star is a joint initiative between the United States Department of Energy and the Environmental Protection Agency, who together implement efficiency standards for electrical appliances and various building components with the overall goal of reducing

³⁸ U.S. Dept. of Energy, *Swimming Pool Covers*, http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13140 (last updated Mar. 24, 2009).

³⁹ *Id.*

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ Energy Star, *History of Energy Star*, http://www.energystar.gov/index.cfm?c=about.ab_history (accessed Sep. 1, 2010).

power consumption and greenhouse gas emissions.⁴⁷ When households and businesses participate in the Energy Star program by installing and using approved appliances and building plans, they may be entitled to federal income tax credits that are deductible from their yearly federal income taxes.⁴⁸ Each taxpayer is entitled to a tax credit equal to 30% of the cost of qualified improvements, with a limit of \$1500.⁴⁹

The American Recovery and Reinvestment Act of 2009 expanded the Energy Star program to cover a wider variety of energy-efficient products, including solar water heaters.⁵⁰ Appliances now covered by the Energy Star program include certain types of pool heaters⁵¹ but not pool filters⁵². Although some solar water heaters are now covered under the program, components used to heat pool water are not entitled to a tax credit.⁵³

Pool Heaters Covered Under the Energy Star Program

The Department of Energy has enacted several regulations regarding the requirements for pool heaters to be included in the Energy Star Program.⁵⁴ Essentially, for gas-powered heaters, to be considered for the Energy Star Program a model must meet energy-efficiency standards as a function of the amount of heat it produces compared to the amount of fuel it burns (thermal efficiency), the amount that the thermal efficiency changes throughout the seasons (pool heater heating

⁴⁷ *Id.*

⁴⁸ 26 U.S.C. § 25C (2006).

⁴⁹ *Id.*

⁵⁰ 26 U.S.C.A. § 48C (2010).

⁵¹ 42 U.S.C. § 6292(a)(11) (2006).

⁵² E-mail from ENERGY STAR Support, energystar@mailca.custhelp.com, to Kevin Wozniak, Student, Stetson U. College L., *Pool Filters and Covers [Incident: 100901-000063* (Sep. 2, 2010) (copy on file with Author).

⁵³ 26 U.S.C.A. § 25C, Energy Star, *Is There a Tax Credit for Solar Water Heaters?*, http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std_adp.php?p_faqid=6496&p_created=1254235884 (accessed Sep. 13, 2010).

⁵⁴ 10 C.F.R. 430.23(p) (2010); 10 C.F.R. part 430, subpart B, appendix P.

seasonal efficiency), and the annual energy consumption.⁵⁵ Solar powered and heat pump pool heaters are not qualified for rebates under the Energy Star program.⁵⁶

State and Local Programs

The State of Florida offers several tax incentives pertaining to renewable energy production. In 1997 the state exempted solar power systems from the state sales tax, including solar heaters for pools.⁵⁷ Also in Florida, real property on which a renewable energy device is installed and used is entitled to a property tax exemption equal to the cost of the device and the cost of its installation.⁵⁸

Sarasota County has used stimulus money obtained from the American Reinvestment and Recovery Act to initiate a local loan program known as “Get Energy Smart Loan Retrofit Loan Program.”⁵⁹ The program offers a 0% interest loan of up to \$5000 for home improvements that provide greater energy-efficiency.⁶⁰ As the program specifically prohibits solar pool heating systems,⁶¹ the only benefit pertinent to pools is a loan of up to \$500 to pay 25% of the cost for gas-powered water heaters covered by the Energy Star program.⁶²

Gainesville Regional Utility, a municipally owned public utility, provides a rebate for variable-speed and variable-flow pumps.⁶³ The rebate ranges from \$100-\$350 depending on the type of pump installed, and provides up to \$50 more for

⁵⁵ *Id.*

⁵⁶ *Supra* n. 54 (providing that pool heaters are qualified for the Energy Star program based upon how much natural gas or oil they use).

⁵⁷ Fla. Stat. § 212.08(7)(hh) (2010).

⁵⁸ Fla. Stat. § 196.175.

⁵⁹ Sarasota County Government Online, *Get Energy Smart Retrofit Program 2-3*, <http://www.scgov.net/retrofit/documents/ProgramGuidelines.pdf>

⁶⁰ *Id.* at 3.

⁶¹ *Id.* at 12.

⁶² *Id.*

⁶³ GRU, *Pool Pump Rebate*, <http://www.gru.com/YourHome/Conservation/Energy/Rebates/pool.jsp> (accessed Sep. 15, 2010).

installation.⁶⁴ Since its inception in 2008, over 550 customers have participated in the rebate program.⁶⁵

Private Initiatives

NV Energy, a private power company operating in Nevada and California, provides a rebate of \$200 for pool owners to upgrade their single-speed filtration pumps to more efficient variable-speed pumps.⁶⁶ The company is also providing free installation and calibration to ensure that the pumps operate at maximum efficiency.⁶⁷

Recommendations

The Best Choices for Pool Owners

Pool Filters

In order to take save energy, pool owners need to limit the amount of time that their filters run each day.⁶⁸ Variable speed pumps or variable flow pumps can be adjusted to reduce power consumption when the pool is not in use, so these would likely be the best option to take full advantage of the possible energy savings.⁶⁹ Because efficiency depends upon the design of the entire filtration system,⁷⁰ pool owners may want to consider a system-wide approach to replacing their pool filters, including switching to pipes, drains, and skimmers that would enhance the effectiveness of the filter by decreasing the energy required to pump the water toward and away from the filter. Pool owners should consult with professional installers to determine what kind of design will best suit their needs.

⁶⁴ *Id.*

⁶⁵ E-mail from GRU Customer Service, customerservice@gru.com, to Kevin Wozniak, Student, Stetson U. College L., *General Inquiry* (Sep. 23, 2010) (copy on file with Author).

⁶⁶ NV Energy, *Pool Pump Rebates for Southern Nevada*, <http://www.nvenergy.com/saveenergy/home/rebates/poolpumps.cfm> (accessed Sep. 15, 2010).

⁶⁷ *Id.*

⁶⁸ *Supra* n. 10.

⁶⁹ *Id.*

⁷⁰ *Supra* n. 16.

Pool Heaters

Because the efficiency of each type of pool heater is largely dependent upon the climate in which it is used,⁷¹ pool owners should consult the Department of Energy website to determine what type of heater would best suit their individual needs.

In Florida, all evidence points to solar heaters as being the best possible option for efficient and long-lasting enjoyment,⁷² owing in large part to the sunny climate. The fact that the State of Florida also provides tax breaks for solar power should remove all doubt that solar heating is the most economical option for Floridians.

Pool Covers

Because pool covers conserve energy provided by the sun, energy provided by heaters, and prevent water from evaporating, responsible pool owners should use them. The amount of savings that a cover provides immediately justifies the prices of buying one.⁷³

The Future Role of Government

Because the Energy Star Program and similar state and local incentives predominantly provide only for gas-powered pool heaters and do not address pool filters and covers at all, significant improvement is needed to energy that home swimming pools are operated in an energy-efficient and environmentally sustainable manner.

As a policy matter, it is understandable that a government would not want to subsidize purchases that are not vital for everyday life. It is a fact that swimming pools are essentially a luxury item, unnecessary for everyday life. However, energy conservation should be a goal regardless of the nature of an electrical item, and the existence of energy-efficient alternatives to currently used equipment should warrant government consideration. Indeed, the facts that some pool heaters are

⁷¹ *Supra* n. 17.

⁷² *Supra* nn. 31-32 (discussing how solar heating systems pay themselves off over time).

⁷³ *Supra* n. 38.

covered under the Energy Star program and the State of Florida exempts solar heaters from sales and property tax suggests that the federal and state governments agree with this goal to some extent.

Because the potential energy savings of efficient pool systems is so substantial, all governments, whether federal, state, or local, should consider incentives to promote their installation and use. The federal government should consider adding efficient filters, heaters, and covers to its Energy Star program. The State of Florida is doing a good job by providing property tax exemptions for solar energy improvements, but the State should also consider exempting efficient filters and covers as well. Local governments, while limited in financing and manpower, have the benefit of being close to the action and can more easily tailor programs to suit the needs of their communities. Local governments could benefit by partnering with utility companies, whether the utilities are municipal, regional, or privately owned, because utilities have practical knowledge to determine the best course of action in ensuring that pools are using the most energy-efficient and cost-effective equipment available. The example set by Gainesville Regional Utility should be examined and considered by other local governments with their own municipal utilities. Local governments that rely on private utilities can negotiate with them to create programs similar to that of NV Energy.

Federal, state, and local governments should consider administering a system-wide approach to creating incentives for pool pump replacement. Because the energy-efficiency of pool motors is largely dependent upon the configuration of the entire filtration system, including the pipes, skimmers, and drains,⁷⁴ the government on each level should emphasize incentives that go toward this system-wide approach to reducing a pool filter's energy consumption.

To assuage those who do not want to promote or subsidize more pool building limiting the incentives to retrofitting existing pools seems like a reasonable compromise. In this manner tax dollars will not encourage more energy

⁷⁴ *Supra* n. 16.

consumption by way of subsidizing future pool building. Providing incentives for extant pools would also promote sales and relieve pool owners of a monetary burden during the current economic downturn, though this would have to be weighed against the budgetary concerns of each government.

Another step that local governments can take is to restrict the types of pool systems that can be installed in new pools. The widespread availability of energy-efficient systems means that allowing homeowners to install inefficient systems in their pools has no benefit whatsoever to either the homeowner or society at large. New pools with inefficient equipment would only add to the existing burden of energy overconsumption and drive up the cost of energy for everyone. Because efficient filters and heaters save energy and money over time, local governments should ensure that only such equipment is used in future pool building. Local governments may phase out current pool permitting practices and new permitting maybe based upon the efficiency rating of a proposed swimming pool as a whole. Criteria for determining what type of efficiency ratings are appropriate should be based on scientific data and should also be made with the cooperation of industry leaders.

Conclusion

Energy efficiency is an important goal for sustainable development and the responsible use of limited resources. All avenues of enhancing energy efficiency should be explored, and that includes increasing the energy efficiency of home swimming pools.

The primary responsibility for efficient swimming pool operation rests with the pool owners. They have the power to greatly reduce the energy consumption of their swimming pools by using filters, heaters, and covers that maintain the functionality of swimming pools as efficiently as possible.

Federal, state, and local governments and utility companies should provide incentives to promote the use of energy-efficient pool equipment because the amount of energy that new, efficient equipment will save greatly furthers the goals

of sustainable development and resource conservation. Monetary incentives would encourage pool owners to replace inefficient equipment, which will save them money and reduce energy consumption. Regulations regarding efficiency standards for future pool building will ensure that long-term sustainability is not undermined by future development.