



Energy Smart Management HEAT PUMP POOL HEATERS

OVERVIEW

Swimming pools are big energy consumers. Pool owner/ operators spend billions of dollars annually to heat the nation's pools. Much of this energy is often wasted and can be saved with proper management. Wasting energy also contributes to our growing air quality problem.

RSPEC is a national program that asks you to consider measures to Reduce Swimming Pool Energy Costs.

POOL HEATING BASICS

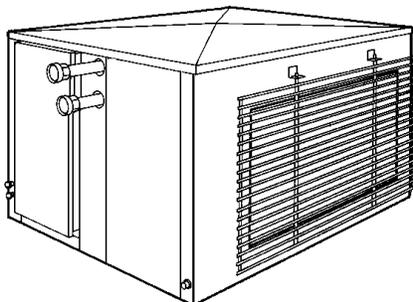
Why do pools cost so much to heat? Pools lose energy in a variety of ways, but evaporation is by far the largest source of energy loss for swimming pools. When compared to evaporation, all other losses are small.

The reason evaporation has such an impact is that evaporating water requires tremendous amounts of energy. For every gallon of water that evaporates out of a pool, it takes with it over 8500 Btus, and a typical pool loses 1 to 1½ inches of water a week. For a 1000 square foot pool, an inch of water equals 625 gallons or over 50 therms of natural gas every week. (A therm is equal to 100,000 Btus. Because of all the energy required to evaporate a gallon of water, evaporation turns out to be 70% of the heat loss from a pool.

MINIMIZE THE HEAT LOSS

The first step in selecting a pool heating system is to minimize the heat loss from the pool, which in the case of pools is primarily evaporation.

How do you stop evaporation?... Use a pool cover. Pool covers are the most effective way to reduce pool heating costs. By covering the pool when it is not in use, you can greatly reduce your pool heating costs. See the RSPEC fact sheet on Pool Covers for additional information.



WHAT TEMPERATURE?

The decision on how warm to keep the pool is up to the individual owner. The temperature recommended by the American Red Cross for competitive swimming is 78° F. This comfort level also coincides with good fuel savings.

However, this may be too cool for young children and the elderly who may require a temperature of 80° F or higher. The typical range for pools is 78°- 82° F. Keep in mind, however, that the energy consumption for each degree rise in temperature will cost from 10-30% more in energy costs depending on your location. In warmer climates the percentage is higher due to the relatively low cost of heating a pool at 78° F.

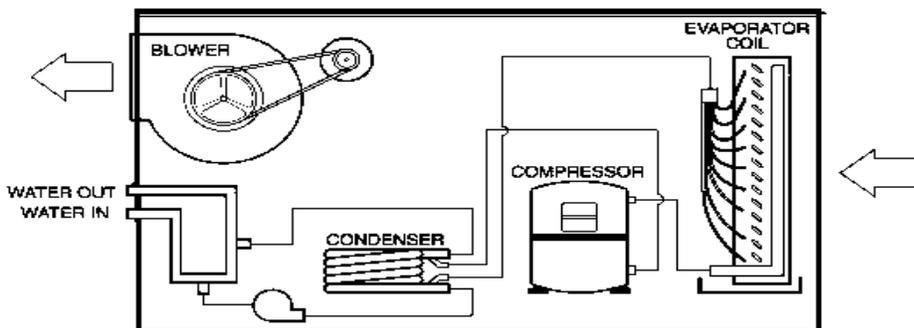
The following chart shows costs of heating pools in different parts of the country to different temperatures. The figures are based on a 1000 square foot outdoor pool heated by a heat pump pool heater with an average COP of 5.0 at \$.085/kwh. The pool season also varies by location and the pool is uncovered for 8 hours per day.

| Location | Season | Temperature | | |
|-------------|-----------|-------------|--------|--------|
| | | 78° | 80° | 82° |
| Miami | 1/1-12/31 | \$1100 | \$1460 | \$1845 |
| w/ cover | 1/1-12/31 | \$215 | \$300 | \$410 |
| Phoenix | 3/1-10/31 | \$680 | \$875 | \$1090 |
| w/ cover | 3/1-10/31 | \$45 | \$85 | \$125 |
| Dallas | 4/1-10/31 | \$760 | \$970 | \$1240 |
| w/ cover | 4/1-10/31 | \$90 | \$140 | \$205 |
| Atlanta | 4/1-10/31 | \$840 | \$1110 | \$1425 |
| w/ cover | 4/1-10/31 | \$155 | \$205 | \$290 |
| Los Angeles | 5/1-10/31 | \$950 | \$1210 | \$1485 |
| w/ cover | 5/1-10/31 | \$85 | \$155 | \$240 |
| Kansas City | 5/1-10/31 | \$715 | \$935 | \$1185 |
| w/ cover | 5/1-10/31 | \$145 | \$205 | \$270 |
| New York | 5/1-9/30 | \$740 | \$975 | \$1220 |
| w/ cover | 5/1-9/30 | \$105 | \$150 | \$200 |
| Chicago | 5/1-9/30 | \$810 | \$1035 | \$1270 |
| w/ cover | 5/1-9/30 | \$105 | \$150 | \$195 |
| Denver | 5/1-8/31 | \$875 | \$1055 | \$1245 |
| w/ cover | 5/1-8/31 | \$70 | \$100 | \$150 |
| Boston | 5/1-8/31 | \$875 | \$1075 | \$1280 |
| w/ cover | 5/1-8/31 | \$120 | \$165 | \$235 |
| Minneapolis | 6/1-9/30 | \$660 | \$850 | \$1040 |
| w/ cover | 6/1-9/30 | \$100 | \$125 | \$190 |
| San Fran | 6/1-8/31 | \$800 | \$950 | \$1110 |
| w/ cover | 6/1-8/31 | \$95 | \$165 | \$240 |
| Seattle | 6/1-8/31 | \$770 | \$900 | \$1035 |
| w/ cover | 6/1-8/31 | \$150 | \$215 | \$280 |

HEAT PUMP POOL HEATERS

Today an emerging method of heating pools is the heat pump pool heater. A heat pump's efficiency is dependent on the outside temperature and since pools are usually used during warm and mild weather, heat pumps are a very efficient method of heating pools.

Heat pumps do not generate heat, they simply capture it and move it from one place to another. Below is a diagram



that shows how heat pumps operate.

How efficient is a heat pump? That's not an easy question to answer. Heat pumps don't have a simple efficiency number to work with. Their efficiency is measured by Coefficient of Performance (COP).

Just like other heating options, heat pumps can have low efficiencies or high efficiencies. Their COP can range from 3.0-7.0. The higher the number the more efficient the heat pump. What this means is that for every unit of electricity that you put in to run the compressor, you get 3-7 units of heat out of the heat pump. These COPs are usually determined by testing the unit with an outdoor temperature of 80°F and a pool temperature of 80°F. But there is no standard test, so you should be aware of this. The higher efficiency units usually use scroll compressors versus the reciprocal compressors of the standard units.

WHAT SIZE?

Pool heaters are mainly sized according to the surface area of the pool and the difference between the pool and average air temperatures. The heating load is also affected by other factors such as wind exposure, humidity levels and cool night temperatures. Pools located in areas with higher average wind speeds at the pool surface, lower humidity, and cool nights will require a larger heater. You should consult with a trained professional on determining the size you need.

DETERMINING IF A HEAT PUMP IS FOR YOU

The first step in determining if a heat pump pool heater is the choice for you is to determine the efficiency of your existing heater. If it's an electric resistance heater, the efficiency is 100%. If its a gas heater, use the chart below. Some pool heaters include this information on the name plate.

| Years Old | Efficiency |
|-----------|------------|
| 5-10 | 70-75% |
| 10-20 | 60-65% |

The following chart shows what you can save with a heat pump compared to a gas or electric resistance heater for every \$1000 in current annual pool heating costs by installing a high efficiency heat pump pool heater. These calculations are based on an electric cost of \$.085/kwh and a natural gas cost of \$.50/ccf. A seasonal average COP of 5.0 was used to determine the savings.

| Current Htr Eff | Cost w/ 5.0 COP | Annual Savings |
|-----------------------------|-----------------|----------------|
| Gas Pool Heater | | |
| 55% | \$550 | \$450 |
| 60% | \$600 | \$400 |
| 65% | \$650 | \$350 |
| 70% | \$700 | \$300 |
| 75% | \$750 | \$250 |
| 80% | \$800 | \$200 |
| 85% | \$850 | \$150 |
| 90% | \$900 | \$100 |
| 95% | \$950 | \$50 |
| Electric Pool Heater | | |
| 100% | \$200 | \$800 |

OTHER FACTORS:

Efficiency is one consideration, but you should also consider the reputation of the manufacturer and/or dealer who will install your heater. Get some references of satisfied customers and call the Better Business Bureau if you don't have anything to go on. Also be sure to ask for and read all warranties before making you decision

OTHER TIPS:



The following are additional tips to help you reduce your pool heating costs.

1. Keep a thermometer in your pool. It will help you determine the temperature that is perfect for you.
2. Keep your pool

thermostat at the lowest setting that still maintains a comfortable swimming environment.

3. Mark the "comfort setting" on the thermostat dial to avoid accidental or careless overheating.
4. Lower your thermostat setting to 70° when the pool is to be unused for three or four days. For longer periods, shut the pool heater off.
5. Protect your pool from wind. Use a fence or hedge. A 7 mph wind at the surface of the pool can triple a pool's heat loss.
6. Use pool cover when the pool is not in use. This can reduce your pool's energy consumption by 50-75%.
7. Get your pool heater tuned up annually. A properly tuned pool heater will operate more efficiently

POOL ANALYSIS!

How much could YOU save by installing a high efficiency heat pump pool heater? Contact the organization who supplied you with this fact sheet (listed in the box below) to receive an energy analysis of your pool using the Department of Energy's *Energy Smart Pools* software. Or you can download a free copy of the software from the **RSPEC** Internet web site at: <http://www.eren.doe.gov/rspec>.

You will also find additional fact sheets and information on saving energy in pools at the **RSPEC** web site or by calling the Energy Efficiency and Renewable Energy Clearinghouse at 800-DOE-EREC.

TELL A FRIEND

If you know someone else who's interested in saving money on their pool operation, feel free to pass along a copy of this fact sheet to them. Reproduction and distribution of this piece or any of the **RSPEC** fact sheets or software is not restricted, but actually encouraged. **RSPEC** can make a difference!

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