Cooling with Pool Heaters

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Inspired by Harold Hays Sky Therm designs, Zomeworks has worked for over a decade on cooling with night sky radiation. We have manufactured thousands of passively cooled battery cabinets for the telephone companies. We have cooled large shelters and patented a cooling system, US patent # 6,357,512, which also heats during the winter.

It has been difficult to get people to understand how effective cooling with night sky radiation is. We need to find a way to show the public how well it works.

One opportunity, suggested by Jesse Rodefer, is to use swimming pool solar heaters during the night to cool buildings. Running pool collectors at night is a familiar way to cool pools in very hot climates, it can also be used to cool buildings provided there is the proper thermal storage and means for the thermal storage to absorb heat from the building. We must find the different relationships between the components that work for different climates. Fortunately the hotter the climate, the higher the temperature we regard as cool. Using pool heaters as coolers is more inviting than installing new radiators. The pool collectors are already paid for, the only additional expenses are the thermal storage, means of heat transfer, pump and controls. This may be a sizeable expense on the first installations, but it is less of a hurdle than having to pay for the radiator as well.

I believe promoting pool heaters as house coolers is an ideal way to interest the public in our patented heating and cooling method. The pool heater is not the exact radiator we would use in our Cool Cell™ systems. Resistance to flow is too great to be used in thermosyphon. A pump must be installed for circulation, but the pump can be small and inexpensive to run. The control can consist of a sensor measuring Sol Air temperature. When Sol Air temperature is below a set level the pump goes on, when above it goes off. Our system requires no pump or control for cooling.

The success of the cooling system depends very much on the closeness with which the house tracks the storage temperature. The house must be well insulated and there must be an intimate thermal coupling between house and storage. With overhead pipes this coupling can be as much as 3 BTU/ °F per hour per square foot of floor.

If the coupling is weaker than this, the house may become too warm even though the storage is cool.

There are tens of thousands of solar swimming pool heaters, which could be used to cool a garage, or rooms in the house. Storage is all-important. It can be a large insulated tank outside connected to heat exchangers inside.

Storage can consist of bare PVC pipes in the ceiling and walls that cool passively. These are questions, which will require many trials to answer.

There are tens of thousands of candidates for radiant cooling where a big part of the system is already paid for. The designer has a running start. He's getting something for nothing, he is harvesting a second crop off his solar pool heater.

It would be difficult to justify a system in terms of electricity savings alone. Consider a pool collector radiating 150 BTU's per square foot per night for 120 nights per year. Against an electric system with an EER

of 10 this saves only 1.5 kWh per square foot per year. The radiant cooling system must replace a conventional electric air conditioning unit. The cost of 400 ft of 8" PVC pipe, a suitable thermal mass for 400 square feet of house, could be less than adding another 1 ton A.C. unit and there is no noise, no drafts, and almost no power bill. 400 square feet of radiator would provide the same cooling, 60,000 BTU's, as a one ton unit on 5 hours each day.

A solar pool heater used to cool during the summer can't heat the house in winter if it is heating the pool, in many climates the pool is only heated during mild weather in spring and fall, during the winter the pool heater, suitably designed to drain down at night, could heat the space it cooled in summer.

The following pictures show a ceiling crossed by 8" PVC pipes with high and low headers and a wall storage system using a flattened helix of 4" PVC sewer pipe winding its way from the floor up to 6'.

Also shown are 6" pipes to be installed vertically with high and low headers in a wall. All these storage arrangements have about 20 lbs. H_2O per square foot and should approximately match their radiator in area.