

## Di Thermal Cool Cell™ Systems – part of passive solar

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Steve Baer  
Zomeworks Corporation  
PO Box 25805  
Albuquerque, New Mexico 87125

[505] 242-5354 phone  
[505] 243-5187 fax

A success story in natural heating and cooling of buildings has been to use lots of insulation, carefully placed windows for solar gain and ventilation and slab floors and interior masonry walls as thermal mass. Each component, insulation to protect comfort, windows to admit sunlight or cool night air and thermal mass to even temperature fluctuation has been essential. These methods, which are often referred to as passive solar have been effective because they are simple, have few moving parts, are long lasting, easy to understand and low cost. Complicated systems using high temperature collectors, isolated heat storage and heat exchangers have not often proved cost effective.

Di Thermal Cool Cell™ systems are advanced passive solar systems. A new component is added; a large unglazed radiator/absorber and a key component; the thermal storage is made to flow rather than remain static. This makes a dramatic difference in the performance of houses, particularly in cooling. Cooling is trickier than heating. Insulation alone can't keep you cool. Inner gains must be transferred out of the house. Ventilation of night air is a marginal way to cool. One depends on cool outside air, but it doesn't appear until the surface of the earth has cooled and then the air temperature lags behind the earth surface temperature. Once the air is comfortable, it still isn't able to carry much heat away from the inside walls, for that it needs to be cold or driven rapidly by large fans.

Harry Thomason and Harold Hay built houses in the 1950 and 1960's that cooled by radiating heat directly to the night sky. This must be repeated. The house must be first to loose heat, the house can't wait in line behind the atmosphere. In very hot climates people have slept on the roof to cool. A radiator with flowing storage is able to turn the house inside out, to have the house cool on its own roof. The radiator collecting heat during sunny winter days can heat the house.

Flowing water carries heat, 4000 times better than air. Water is approximately a thousand times as dense and a pound of water carries four times as much heat as a pound of air.

1000 cubic feet of air, an entire roomful, holds the same heat as 2 gallons of water. Water is cheap, as are pipes, valves and plastic tanks. Air is no way to carry heat, the resistance to heat flow is so great that air pays little attention to the temperature of surfaces around it. Outside air, at 75°, passes over surfaces cooled by night radiation to 60°F but it tells the house it is 75°F outside. Water (and it only takes 1/4000 the volume) is twenty or thirty times as good at learning the temperature, it tells the house the 61°F after the same visit.

These are the reasons that flowing storage and outside radiators are such a welcome addition to the heating and cooling of buildings. It is puzzling that we do not yet have such systems. Perhaps it is because we have been shy about plastic taking its rightful place in our buildings. Plastic has made a timid entrance in sewer lines, siding and plastic containers for our refrigerators.

