



Energy Savings Calculator

The three main factors that contribute to the energy efficiency of radiant heat and more specifically Warmboard are detailed within this document. In the last paper entitled, “*How to build a home that if it were a car, would get over 100 mpg*”, potential savings credited to radiant heat were discussed. The components listed below are based on research documentation and substantiated facts. Real world examples are also given which show savings in dollars and cents.

- 1) A more or less typical radiant heated home in the US can expect **25% energy savings** over a conventional forced air home. This 25% savings can be attributed to radiant heat’s reduced stratification and the use of lower air temperatures for the same comfort. A study done at Kansas State University in conjunction with the American Society of Heating Refrigeration and Air-conditioning Engineers (ASHRAE) established the 25% figure for a radiant system running baseboard heaters at high water temperatures.

Example: If it costs \$4000 to heat a 3000 sq ft home a homeowner would save \$1000 by using radiant heat instead of forced air.

- 2) When high efficiency boilers are used in conjunction with a radiant heat system even more energy can be saved. Most modern high efficiency boilers are termed condensing boilers because the water vapor in the flue gases condense into water droplets on the heat exchanger thereby extracting the maximum amount of energy from every gallon of fuel oil or cubic foot natural gas. The lower the water temperature the more efficient the boiler operates.

Water Temp.*	Efficiency*	Savings	Equivalent Radiant System Water Temp.
104°	96%	---	Warmboard
140°	89%	7%	Gypcrete
167°	85%	11%	Staple Up / Baseboard

**Data taken from Viessmann manual, Vitoden 200 gas fired condensing boiler*

Example: If it costs \$3000 (\$4000 with 25% radiant savings) to heat a 3000 sq ft home a homeowner would save an additional \$210 (7%) by using Warmboard instead of Gypcrete for a total savings of \$1210.

A homeowner would save an additional \$330 (11%) by using Warmboard instead of Staple Up for a total savings of \$1330.

- 3) Many state energy codes require that programmable (set back) thermostats be installed to allow energy savings at night when occupants are sleeping. Warmboard’s low mass allows the efficiency of temporary temperature set back while high mass systems (Gypcrete) never make use of this feature because it takes so many hours for them to change their output. Fast responding Warmboard works quite well with both night time and vacation set back, saving additional energy in the process. California’s Title 24 cites **5% energy savings** from using programmable thermostats.

Example: If it costs \$2790 (\$4000 with 25% radiant savings and 7% savings using Warmboard instead of Gypcrete) to heat a 3000 sq ft home, a homeowner would save an additional \$139.50 (5%) by using a programmable thermostat for a total savings of \$1349.50.

If it costs \$2670 (\$4000 with 25% radiant savings and 11% savings using Warmboard instead of Staple Up) to heat a 3000 sq ft home, a homeowner would save an additional \$133.50 (5%) by using a programmable thermostat for a total savings of \$1463.50.

Radiant Pay Back

If the investment of a Warmboard radiant system is folded into the total mortgage amount and energy savings applied, the monthly cost for Warmboard radiant heat instead of forced air is very small. The example below cites a 3000 sq ft home heated with propane and located in Truckee, California.

Warmboard Radiant Upgrade	Monthly Payment for 30 yr Mortgage at 6%	Monthly Energy Savings	Monthly Cost for Radiant
\$21,000	\$125.91	\$121.96	\$3.95

The number one reason Warmboard radiant heat is chosen is for it's superior comfort over forced air. Now it's possible to have that comfort for the price of a couple of cups of coffee a month.