

ENERGY SAVINGS CALCULATOR – White Paper

This white paper discusses the three main components that contribute to the energy efficiency of Warmboard radiant heat. Examples are provided to put into perspective the realized dollar savings. The information below is based on research documentation and substantiated facts.

Component ONE

A typical radiant heated home in the United States can expect about a **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 a 3000 square foot home costs \$4000 to heat, a homeowner would save \$1000 by used a radiant system over forced air.

Component TWO

Even more energy can be saved with a radiant system in conjunction with high efficiency boilers. 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 of natural gas. The lower the water temperature the more efficient the boiler operates.

| Radiant System | Efficiency* | Energy Cost Increase over a Warmboard system | Water Temp – Degrees F |
|-----------------------|-------------|--|------------------------|
| Warmboard | 96% | --- | 104 |
| Gypcrete | 89% | 7% Increase | 140 |
| Staple Up / Baseboard | 85% | 11% Increase | 167 |

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

Example

If a 3000 square foot home with a radiant system costs \$3000 to heat (25% radiant savings included), the homeowner would save an additional amount between \$210 and \$330 or 7% and 11% respectively. By using a Warmboard radiant system over other radiant systems, a homeowner can **save between \$1210 and \$1330**.

Component THREE

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 (namely, 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 and vacation set back, saving additional energy in the process. California Title 24 cites 5% energy savings from using programmable thermostats.

Example

If a 3000 s.f. home costs \$2790 to heat (25% radiant savings and 7% more savings for using Warmboard over Gypcrete), a homeowner would save an additional \$139.50 or 5% by using a programmable thermostat for a total **savings of \$1349.50**. The same would go for a Warmboard system over Staple Up except that a homeowner would save 25% + 11% + an additional 5% with a programmable thermostat for a total savings of \$1463.50.

RADIANT PAYBACK

If an Warmboard radiant system is folded into a total mortgage amount and energy savings applied, the monthly cost for Warmboard radiant heat instead of forced air is miniscule. For example, in a 3000 s.f. home in Truckee, CA, heated with propane:

| Warmboard Radiant Option | Monthly Payment for 30yr mortgage at 6% | Monthly Energy Savings | Monthly Cost for Radiant Heat |
|--------------------------|---|------------------------|-------------------------------|
| \$21,000 | \$125.91 | \$121.96 | \$3.95 |