

# A new level of energy efficiency

Energy efficiency has always been one of the key reasons for building a home with radiant heat. Given the rapidly escalating cost of energy, the efficiency of radiant has never been more important. Here's how energy use differs between technologies.

## Parasitic heat loss

“Parasitic loss” refers to energy lost due to inherent inefficiencies of a system.

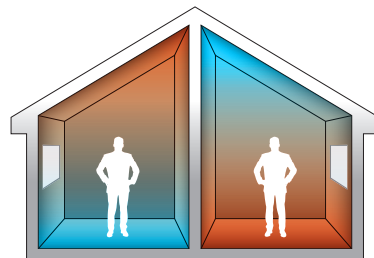
Duct work is well known for its parasitic energy loss. As hot air blows through ducts, heat is absorbed through its walls and released into unheated areas of the house, such as crawl spaces.

Additionally, when hot air is blown into a room with a door closed, air pressure may increase. This pressure builds and is released outside through weakened weather stripping on windows and door frames.

Blowers used in forced air systems typically require 9x as much electricity as the pumps in a radiant system. All of these parasitic losses add up, making the traditional forced air system up to 30% less efficient than radiant floor heating.

## Zoning reduces energy use

Most forced air heated homes have a single thermostat, and therefore a single zone. This is because forced air systems are inherently difficult, and expensive, to zone. Radiant homes have numerous zones because they are easy and inexpensive to create. This allows you to keep their bedrooms at 65°F (18°C) while maintaining 70°F (21°C) in a family room or even turning off the heat in a guest bedroom until needed. Directing the right amount of heat to the right rooms is a big energy saver.



## Low ceiling temperatures

When hot air is pumped through a duct, it is typically between 120–140°F (49–60°C). This hot air rapidly rises and creates a heated layer of air near the ceiling. Stratification increases as the ceiling height increases, and temperature differences can be easily felt by those living in a two-story home, with the downstairs too cool and the upstairs too hot. When ceilings are hot and just below a cold roof, heat loss increases dramatically. This is precisely why ceiling and attics require so much insulation.

Radiant floors stratify much less for two reasons. First, at least 50% of the heat is infrared, a form of invisible light. Like all lighting, its effect is greatest the closer you are to the source. In other words, it concentrates much of its output beneath the floor, where you are, not above you near the ceiling. Second, because the

temperature of a radiant floor is quite mild (75–80°F / 24–27°C), it only warms air into the mid-70s, far less than the 120–140°F (49–60°C) temperatures of a forced air system. It is not unusual for the ceilings in a radiant home to be 10–20 degrees cooler than a forced air home

## Low air temperatures

On a sunny spring day we may feel comfortable outside in a t-shirt and shorts even if the air is only 60°F (15°C). This is because radiant warmth from the sun allows us to be comfortable at lower temperatures. The same is true in a radiant home. With the warmth of the infrared “shining” on us from the floor, the same comfort can be achieved with the thermostat set a couple of degrees lower than what would be needed in a home heated with forced air.

Interestingly, when outside on that same mild spring day we may be comfortable until the wind picks up. Even though the air temperature has not changed, air moving rapidly across our skin causes evaporative cooling. Paradoxically, blowing hot air from a duct can cause you to set the thermostat to a slightly higher temperature to maintain the same comfort achieved in a radiant home at a lower set point.

### Increase savings with Warmboard

Warmboard radiant panels are the most conductive on the market. Warmboard-S and Warmboard-R have a thick aluminum surface (0.025") made of the highly conductive 1060 alloy. This continuous aluminum plate maximizes the contact area with the hydronic tubing, ensuring rapid transfer of heat to interior spaces.

It is a principle of thermodynamics that as conductivity goes up, water temperature can go down – and it is always less expensive to heat water to a low temperature than a high one. It is well accepted in the boiler industry that for every 3° that you lower the water temperature, you save 1% of the heating cost. Compared to other radiant floor systems, our water temperatures can be 60 degrees lower and yet produce the

same heat output. Compared to thin slab systems, Warmboard uses as much as 30° lower water temperatures, creating an additional 10–20% savings!

### Low mass and temperature set back

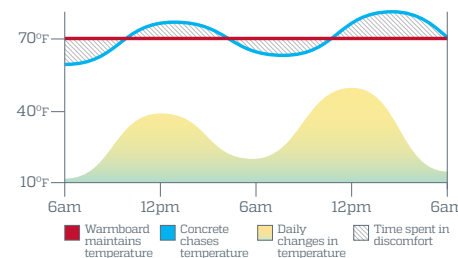
Many states require that programmable (set back) thermostats be installed to allow energy savings at night when occupants are sleeping. High mass radiant systems are unable to make use of this feature because it takes so many hours for them to change their output. Fast response Warmboard works quite well with night time set back, saving additional energy in the process. Vacation setback is another important means for saving energy. If you're going to be away from your primary home, it makes sense to set your thermostat back to 50°F (10°C) to save a considerable amount of energy while you are gone. But if you have a property you use for a few days at a time, using a high mass system may not be worth your while as those systems can take a day or so to get warm. But with Warmboard, you can be comfortable in an hour or two after returning home.

### Maximize the efficiency of condensing boilers

Most modern, high-efficiency boilers are called “condensing boilers” because when they operate below 140°F (60°C), the water vapor in the flue gases condense into water droplets on the heat exchanger, allowing it to extract the maximum amount of energy from every unit of fuel. Because Warmboard systems typically operate well below 140°F (60°C) they can increase the efficiency of these boilers by up to 8% when compared to other radiant systems

### Prevent overshoot

High mass systems have been known for producing too little heat in the morning and too much in the afternoon. This overshoot problem is generally resolved by opening windows to dump the excess heat – heat that you just paid for. Warmboard quickly and accurately adjusts its output to match changing needs, providing the desired temperature regardless of the time of day.



### Alternative heat sources

There are a number of innovative means of heating water, from ground source heat pumps and solar to fuel cell cogeneration, etc. All of these methods are highly efficient, but they are only able to heat water up to 120°F (49°C) – insufficient for most radiant systems. However, Warmboard's high conductivity make it a perfect match for these technologies.

### Save thousands on fuel costs each year

Modern homes are well insulated, have excellent glazing, low energy lighting and a variety of other energy saving features. Adding Warmboard to your home takes savings to a whole new level. We say this not only because of the items detailed above, but because we have many homeowners who report lowering their heating bills by 50-60% in similar sized homes in the same community.

Imagine lowering your heating bills from \$5000 to \$2000, year over year, while being more comfortable than ever before. This is the power of Warmboard.