

Are radiant heating systems more efficient?

In talking about how our radiant heating systems reduce heating costs we often get a lot of responses about how a “BTU is just a BTU” and that claims of increased efficiency are just “magic”. The fact of the matter is that, in the context of heating the same thing – air mass – those statements are perfectly true. The problem is that a lot of heating professionals tend to neglect to factor in radiant heat sources when designing heating systems. Since the vast majority of traditional heating systems heat air and then move it into the living space, that is where the bulk of their experience lies. So let’s talk about how we make living spaces comfortable, and not just how we can heat some air most efficiently.

When you heat a space with a radiant heating panel located on the ceiling, you’re adding another component to the “human thermal comfort” equation. ASHRAE actually has a standard that takes radiant heating into account – ASHRAE standard 55. There are calculators freely available online that implement this standard as well, the CBE Thermal Comfort Tool being a great one.

We’re going to have to get a bit technical here, so bear with me as we calculate two different home environments: first for a home with purely convection heating. Using this calculator, we can find that typical indoor air temperatures of 21°C (and assuming equilibrium with radiant objects in the room of 21°C), produces good thermal comfort as shown in Figure 1.

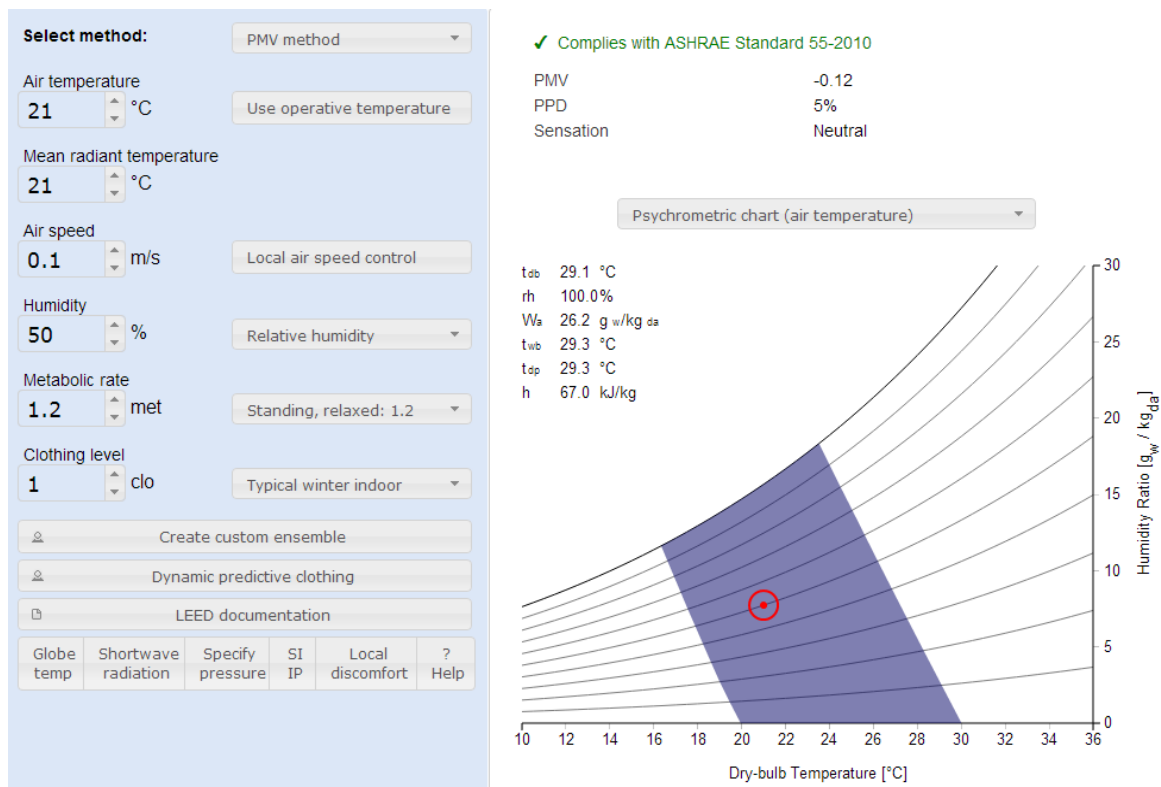


Figure 1 - Pure Convection Home

But what about if we factor in a radiant heater on the ceiling? Our radiant panels typically have temperatures of around 90-100°C, and occupy 1/10 of the space. Averaging this in we get a mean radiant temperature of 27°C. If we plug this into the calculator, we find that good thermal comfort is readily achieved even with mean air temperatures of 16°C as show in Figure 2.

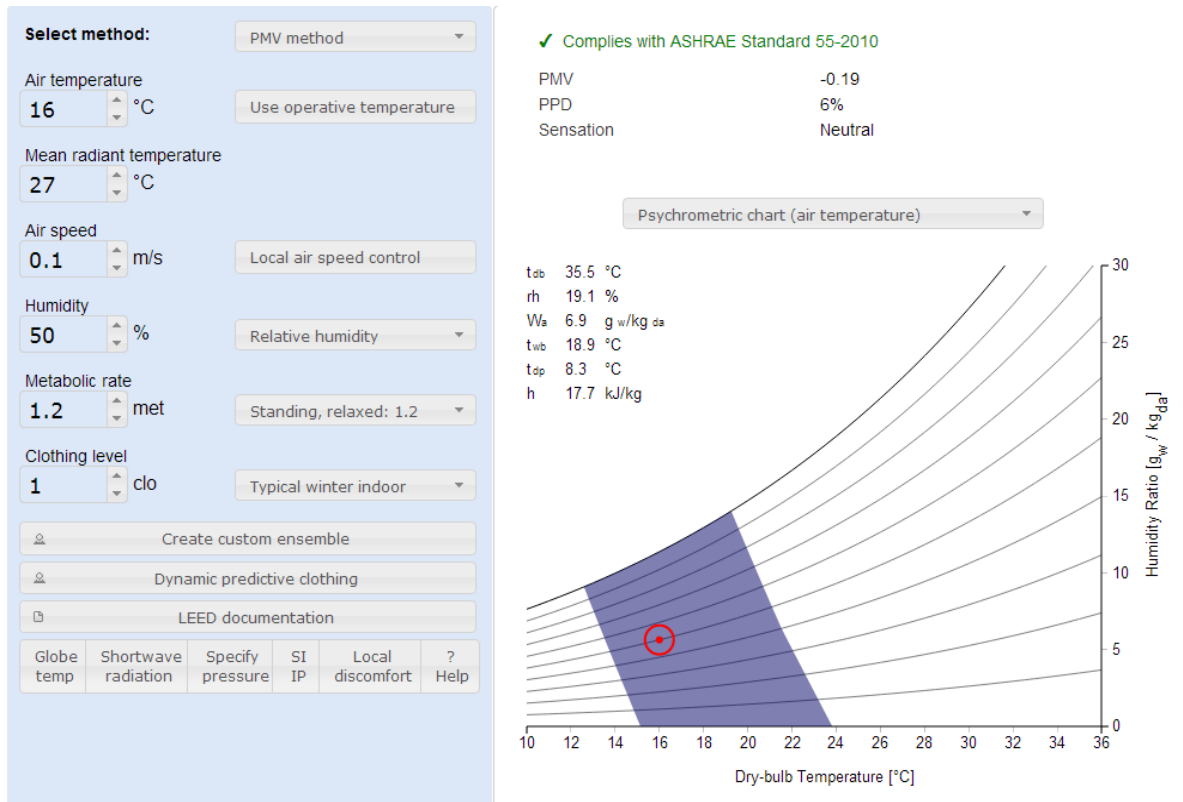


Figure 2 – Radiant Heated Home

Comparing the “Radiant Heated Home” chart to the “Pure Convection Home” chart, you can see that radiant ceiling panels can heat a space comfortably at lower air temperatures by supplementing in infrared radiant heat. But how does this save us on heating costs?

We have to pump heating energy into homes because we are always losing energy to the outside environment. That rate of heat loss is determined by the DIFFERENCE between indoor and outdoor air temperatures. So, by utilizing a lower air temperature with radiant ceiling panels, we reduce our heat loss to the exterior environment, resulting in heat savings. This heat savings is more than the energy required to supply the radiant heating, thus resulting in a net energy savings. This is further improved with zone heating through use of intelligent thermostats that only heat the areas we need, when we need them.

The proof is in the theory, but it’s borne out by our customer’s experiences as well. We have customers who are heating their whole homes using our radiant heating panels and enjoy low monthly electric bills. The efficiency of radiant heating systems is no myth and the technology has many applications where it can excel.