**What Is Radiant Floor Heating**

The best heating system a house can have is the one you don't realize is there. No radiators clanking in the night. No vents whooshing like a jet preparing for takeoff. No dust-spewing ductwork to run up your allergists' bills. Just an even blanket of heat, right where you want it.

That's the appeal of radiant floor heating, says This Old House plumbing and heating expert Richard Trethewey, who has long been a fan. "It's truly invisible," he says. But a radiant heat system has more than just aesthetics going for it. It's also a highly efficient way to heat a house, increasing comfort as it reduces energy costs.

In a radiant setup, the warmth is supplied by hot-water tubes or electric wires buried underneath the floor. As the invisible waves of thermal radiation rise from below, they warm up any objects they strike, which radiate that captured heat in turn. Though the air temperature remains relatively constant, you stay comfortable because the surrounding surfaces aren't stealing warmth from your body.

Contrast that with what happens in a conventional forced-air heating system, the kind found in most American homes. Air blows out of the registers at a well-baked 120 degrees, rises to the top of the room where it quickly sheds heat, then drops back down as it cools. The air in the room becomes uncomfortably stratified: Your head can be bathed in warmth while your toes lie in the frozen zone. Then there's the problem of cycling. "You turn on the furnace, it quickly takes you to 68 or 70, and then shuts off," says Richard. The result is a phenomenon he calls "the cold 70," which is what you feel right after the hot air stops pumping from the registers. Those jarring ups and downs are absent with radiant floors, which may reach 85 degrees, tops, on a frigid day. The warm air still rises, but it does so evenly over the entire floor, so the coolest air stays up at the ceiling. "You're heating where the people are," Richard says.

There are two basic types of radiant floor heating that supply this gentle, even warmth: hot water or electricity. Electric radiant, which uses zigzagging loops of resistance wire, is generally retrofitted to a single room, such as a bathroom or kitchen. (See "The Floor Electric," above.) Hot-water "hydronic" systems—the most popular and cost effective way to heat an entire house—circulate water from a boiler or water heater through loops of 1/2-inch polyethylene tubing. The flexible tubes can be installed in a variety of ways: on top of the subfloor in grooved panels or snap-in grids; clipped ­into aluminum strips on the underside of the floor; or embedded in poured concrete. Once the system is in place, you can cover it with most types of finish flooring, including hardwood and tile. Carpet, however, can be tricky, especially if it has thick padding underneath. "If the floor is too well insulated, radiant heating really ­doesn't make sense," Richard says. "It's like putting a sweater over a radiator."

Hot-water radiant costs more to install than other types of heating systems—from $6 to $15 per square foot depending on the method, whether you're starting from scratch or retrofitting, and where you live. (New builds where the tubes are buried in concrete slab tend to be the least expensive). And you'll still need a separate air-conditioning system for cooling. But if the price tag puts you off, consider this: Once it's up and running, a radiant heat system can be up to 30 percent more efficient than forced-air heating, depending on how well insulated a house is. And there's no comparison when it comes to comfort. In that category, radiant always wins, feet down.

From: https://www.thisoldhouse.com/ideas/radiant-floor-heating