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HYDRONICS
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RADIANT ALL STARS ROUNDTABLE
— FROM BOILERS TO NET-ZERO
THE INTERWOVEN WORLD
OF RADIANT DESIGN

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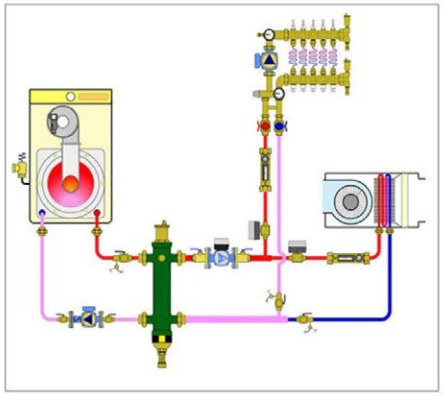

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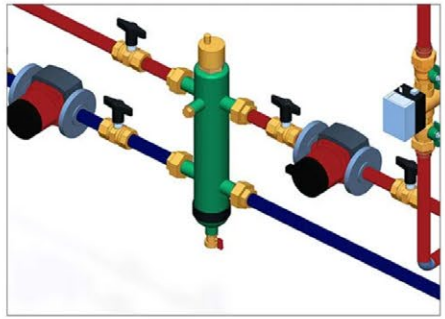

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FROM BOILERS TO NET-ZERO: THE EVOLUTION OF HYDRONICS

INSIGHTS FROM SEASONED PROFESSIONALS ON THE INNOVATIONS, CHALLENGES, AND OPPORTUNITIES REDEFINING RADIANT HEATING.

By Natalie Forster

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Hydronic and radiant heating have a long, storied history — and a future that's rapidly evolving. In this roundtable discussion, industry veterans reflect on the projects that shaped their careers, the technologies that shifted the landscape, and the lessons they've learned along the way. The conversation ranges from early innovations and "old-school" methods to the role of hydronics in an electrified, net-zero world. For contractors, designers, and anyone interested in where the trade is headed, these insights offer both perspective and practical takeaways from those who've lived it.

Step into the minds of radiant and hydronic industry pioneers. For the third year in a row, in this exclusive roundtable discussion, some of the most respected legends and experts in radiant and hydronic heating share their stories, insights and unfiltered opinions. From the projects that first sparked their passion, to the innovations that changed the game, to the challenges and opportunities in an electrifying, net-zero world—this conversation covers it all.

In the video above, *Plumbing & Mechanical* and *Supply House Times* Editorial Director PM **Natalie Forster** moderates a discussion on all things radiant with our incredible panel of Radiant All Stars: **John Barba**, director of sales training at Taco Comfort Solutions; **John Siegenthaler**, consulting engineer and principal of Appropriate Designs in Holland Patent, New York; **Max Rohr**, director of marketing and education, Caleffi Hydronic Solutions; and **Dave Yates**, a former mechanical contractor and owner of F.W. Behler in York, Pennsylvania.

ABOUT THE AUTHOR

Natalie Forster is editorial director of BNP Media's Plumbing & Mechanical Group which includes *Supply House Times & Plumbing & Mechanical*. Reach her at **forstern@bnpmedia.com** or 224-201-2225.

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THE INTERWOVEN WORLD OF RADIANT DESIGN: A MASTERS CLASS FOR INSTALLERS

THE ART AND SCIENCE OF HYDRONIC RADIANT DESIGN: IT'S ALL CONNECTED

By Dave Holdorf

I recall a story told by an installer about a husband and wife who were building their dream home. The husband was a meat n' potatoes guy who, when they turned their attention to the mechanical system design, said he wanted only the basics.

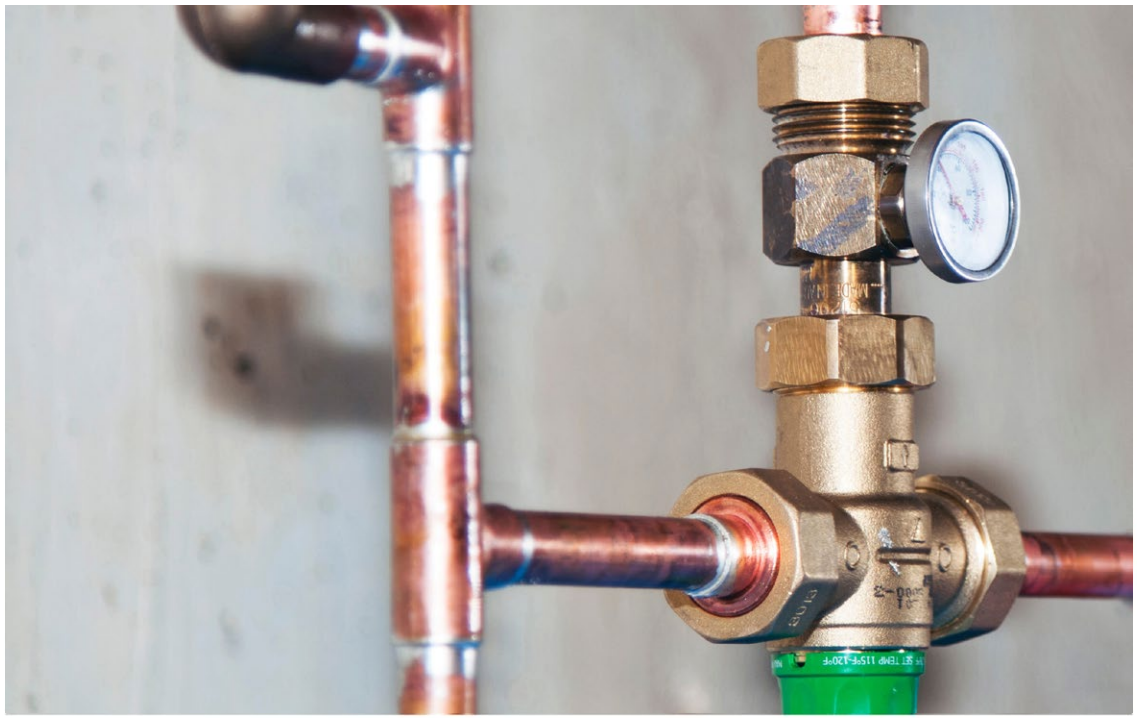
The installer could've given them just that. But the woman of the house wanted something special for herself and their growing brood of kids. Hmm...that was four against one!

Turns out that a friend of hers spoke warmly about an experience with radiant heat. The installer knew just the place to take them: to his own home. As soon as the family entered his home, the installer asked them to remove their shoes. Socks, too! They were puzzled by this, but quickly learned why they were so comfortable on his tiled floors: the radiant heat was *fabulous*.

Needless to say, the plan to install a nine-zone radiant heat system was settled that day.

As hydronics professionals, we often talk about the "magic" of radiant heat, but the true magic lies in the careful crafting of a system design that ensures optimal performance and efficiency. It's not just about putting tubes in the floor; it's about understanding how each design component interacts.

Tube spacing, water temps, pipe size, loop lengths, flow rates, installation methods, and floor coverings are all interwoven and connected. A change in one ripples through the entire system.



A Taco fixed-temperature mixing valve with temperature gauge is used for a radiant floor application.

TUBE SPACING: BEYOND THE INCH MARKERS

The system design that you constructed (or received from someone you trust, of course) provides a lot of important information. But the key question is: where do those numbers come from, and what exactly do they mean? "Why this spacing, or that tube size and loop length?" These are questions I get frequently from installers, and they have a great impact on system performance (or lack of it). For instance, tube spacing isn't a mystery, and it's not arbitrary: it's all about ease of installation.

If the system is going to be a typical residential with a 4-inch concrete slab, the variable for tube spacing chosen may be tied (quite literally) to a reason you may not have thought of.

Are you ready for it? Tube spacing is based on the installation of the wire rebar that's required for the concrete's structural stability. The rebar (also referred to as "rewire") will typically be a six-inch by six-inch grid.

If a design is calling for 6-inch on-center spacing, we choose that. When you're zip-tying the tubing to the rebar, you follow each bar out and then turn right back. If the design calls for nine-inch centers for the tube spacing, you follow one rebar down and then turn around and come down the middle of the next grid. And if it's designed with 12-inch on-center (OC), you get the picture: the tubing is tied to every other rebar. That's it, folks – tube spacing demystified.

HEAT OUTPUT - VS. - COST:

There's a little more to it when it comes to a designer choosing the spacing. I usually start at 12-inch OC and go closer if needed. There are cost implications. Six-inch OC spacing uses twice as much pipe and takes twice as long to install; it's often that simple. Now, why would I want to change the spacing to something closer? It's all about lowering the target water temperature and simplifying the grouping of water temperatures to make the installation and layout of the mechanical room easier.

Now remember: the designed water temperature for a room is based upon heat loss, installation method and the finished floor covering. Just randomly changing the spacing without reviewing these factors can result in rooms/spaces *not* performing the way the customer expects. Changing a room that had a 6-inch OC spacing to 12-inch OC to save on material could result in easily-perceived thermal dissimilarities – or "striping" – on the floor with hot spots directly above the tube and cool spots in between.

Ask the designer about this. Check the design carefully. Rooms with a high heat loss or a large amount of glass on one wall may have a tighter spacing for comfort reasons. Tighter spacing may also be deliberately tailored to eliminate the cold washing your customer could feel while standing in front of those windows. Elsewhere, a fully enclosed basement with low heat loss can easily have wider spacing.

INSTALLATION METHODS + TECHNIQUES: FITTING THE SYSTEM TO THE STRUCTURE

Installation methods and techniques are based upon pipe size, but even more so based on the construction of the house. Make the radiant fit the house; don't change the house to fit the radiant. What this means is that a designer will choose an installation method based on the construction of the house. Use what you have; don't make it harder, less expensive, or complicated. All of these factors go into a smart radiant design.

The different installation methods are:

- Slab-on-grade: tubes embedded in 4-inch thick structural concrete
- Thin slab/thermal mass: over subfloor (e.g., Gypsum concrete)
- Overjoist (sandwich plate): tubes in grooved subfloor systems or panels
- Underjoist: tubes stapled to the underside of the subfloor with or without heat emission plates

Remember, radiant heat is the goal. By giving the customer the best heating system possible, you can mix and match all of these in one house. As I commented earlier, some of these installation methods govern tube spacing.

A technician installs a Taco VT2218 delta-T (ΔT) circulator for a radiant heat application. To the right of it is a Taco modulating iValve used to govern temperature for two radiant heat zones.

With thin slab spacing, like in kitchens and bathrooms with tile floors and a place where being barefoot is a little more common, I like to design at 6- and 9-inch OC. When looking at a sandwich style system, the panels or the systems will already have the spacing manufactured into the design. And when you're designing an underfloor system, with or without plates, the tubing spacing is regulated by the joist spacing: i.e. 16-inch OC joists make the tubing spacing at 8 inches.

AGAIN, LET'S MAKE THE RADIANT FIT THE HOUSE, NOT THE HOUSE FIT THE RADIANT.

I was working with an installer who wanted me to design a system with all thin slab; the finished floors were to be tile and hardwood. Designing a project for all thin slabs creates challenges if the customer wants a hardwood floor. There's nothing to attach the flooring to unless you add another layer of plywood. Sounds fine, right? However, once the system was completed, there were saddles and transitions from one room to the next that the customer wasn't expecting. The hardwood areas – because of the extra layer of ply – were higher than the tiled spaces.

If we'd designed a panelized system for the hardwood areas, we could have gotten the finished floor heights much closer, making transitions smooth and easy. Make the radiant fit the house!

WATER TEMPERATURE: THE GOLDILOCKS ZONE

You'll recall my earlier comment: tube spacing affects water temperature. A given heat loss needs a certain btu/sq. foot. Closer spacing in a slab lowers the water temperature, while wider spacing increases the water temperature. A system designer may change tubing spacing to ease installation requirements in the mechanical room.

The design will call out water temperature requirements for each room. You do *not* need a separate mixing valve for each room! Instead, consider combining rooms of similar water temperatures to one mixing valve.

One thing I watch out for is different installation methods – such as concrete slab and underfloor with plates – because even if they are similar in design and water temperature, they *must* be on different zones. These rooms will respond very differently: the slab room will heat up slowly and give off its heat to the space just as slowly; the underfloor heats up very quickly.

Combine up to a 20 degree difference and consider a modulating mixing valve (such as a Taco i-valve). The design may call for a 20 degree ΔT (temperature differential) on a design day, but when the outside air temperature is higher, that difference in design water temperature actually gets closer.

So why consider this? If there was a fixed temperature mix valve used, and the design for each room called for 140° and 120° water temperatures, you'd need to set the valve for 140°F. When the room that needs 120° only gets a call for heat, the water temp moves to 140° because that's what the mix valve is set for, permanently. It doesn't make the room get too hot, or not work – but the thermostat will satisfy faster than the other room. Again, that's not horrible, but now the floors start to cool down – yet, the air temp is satisfied.

Of course, in this scenario, the homeowner here isn't satisfied. Remember – they wanted warm radiant floors, not just a heated space. Modulating valves add a level of comfort to a space that's hard to describe.

Now you might think: Well, the boiler is modulating, why bother with a mixing valve that's also modulating on outside air temperature? The boiler working on an outdoor reset curve is great, but that's also assuming that the boiler is perfectly sized to the heat loss and there's only one zone in the house. We call that *boiler reset*.

When you have *several* zones working with a modulating mixing valve that is also working on its own outdoor reset curve, I consider that *load reset*. Combine the two – boiler reset, and load reset – now you've got *system reset,* and the result is going to be the most comfortable heating system you can design, and also the most efficient.

Again, pay attention to the spacing and the installation methods to manipulate the design water temps to minimize the number of mixing valves (three temp ranges is my maximum). Your designer may not have called for this deliberately to not "add more tubing" to the project or make it "less expensive," but to design the best possible heating system.

Lower required water temperatures may allow for direct connection to a low-temperature boiler or heat pump, simplifying the mechanical room and reducing equipment costs and complexity. This is a significant design advantage.

And when it comes to modulation, consider the modulating circulators that are out there – not just the ones that will speed up and down based upon the number of zones that are running (Delta P), but for almost the same reason as above: a circulator that modulates temperature (Delta T).

Taco iValve with outdoor reset sensor. IMAGES COURTESY OF TACO COMFORT SOLUTIONS

Another design feature (more for comfort than installation): most radiant floor systems are designed on a 10-degree temperature drop. For example, if the room calls for 120°F on a design, the return temp will be 110°F. This temp drop allows for a nice, even surface temperature in the space, which adds another level of comfort to the space.

Of course, this ideal temperature drop only occurs when these variables line up like dominoes: on a design day, if the circulator is perfectly sized, and when all of the zones on that manifold/circulator combo are on. Okay, it's a rarity – like having your birthday, Christmas, New Year's Day, and a month-long vacation all rolled into one!

Now imagine allowing the circulator to speed up and down all season long to maintain that 10-degree temperature drop, while also maintaining that temperature drop when the zones satisfy. Talk about the perfect alignment of dominoes.

A delta T design also allows for a system to have a circ that automatically sizes itself based on the number of zones calling while also varying its performance with seasonal change. Now imagine what this can do for your water temps that were combined with the mixing valves we discussed above to smooth out those temperatures with different rooms. Near perfection.

THE ART OF HARMONIOUS DESIGN

Thinking about your radiant designs is sometimes about the preferences of the designer, but also the construction of the house, as well as being cost-conscious. However, remember, a lot of the aspects of the design are connected to each other and changing one thing randomly affects other decisions the designer made. I'm not saying that you can't change anything, but choices were made based upon a lot of factors.

Ultimately, successful radiant heat design isn't about mastering one single component; it's about understanding the symphony of interactions between them. When we approach each project with this holistic view, we create systems that deliver ideal comfort, efficiency, performance, and long-term satisfaction.

STILL WANT TO LEARN MORE?

Taco's residential hydronic system design software, specifically FloPro Designer, is a free, user-friendly tool designed to simplify and accelerate hydronic heating system design. The software allows users to create system schematics, calculate heat loss, size components like pipes and circulators, and generate a bill of materials.

Taco's commercial hydronic system design software, part of the HS2 Design Suite, is a collection of tools that helps HVAC designers create and analyze hydronic systems. It simplifies the design process, allowing for quick system sizing, equipment selection, and detailed documentation. The software aims to reduce design time and errors by automating calculations and offering features like drag-and-drop functionality and automatic pipe sizing.

ABOUT THE AUTHOR

Dave Holdorf is a technical trainer, residential, for Taco Comfort Solutions.

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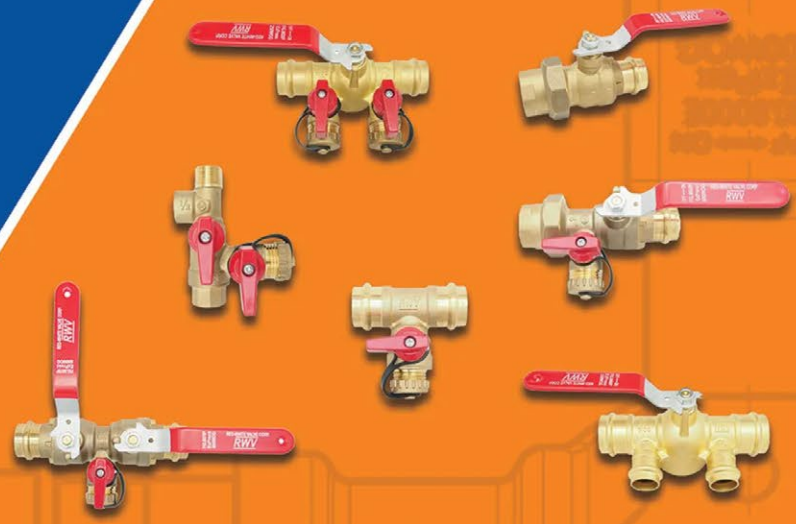

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NO SLIPS, NO SHUTDOWNS: ENSURING ACCESS WITH SNOW MELT SYSTEMS

HOW RADIANT SNOW MELT SYSTEMS ARE TRANSFORMING WINTER SAFETY AROUND THE U.S.

By Kristen Bayles

BWFOLSOM / ISTOCK / GETTY IMAGES PLUS

Life may be all summer fun and hot weather right now, but winter is on its way. While summer brings its own set of problems, things turn to havoc when winter storms roll in. It may seem easy enough for many to avoid the pains of winter in your own home by relaxing by the fire and cranking up the heat, but for businesses of all types, that simply isn't an option. Life must go on despite the ice; many high-risk facilities like hospitals, museums, nursing homes and more can't shut down or slip up.

From emergency room entrances to ambulance bays and parking ramps, these critical access points *must* remain clear. This is important all year round, but during the winter, heavy snow and ice can cause major safety concerns. Unfortunately, traditional snow-removal methods are labor intensive, and leave facilities and homeowners alike vulnerable to slip-and-fall incidents that aren't just expensive; they can be deadly.

Building and home owners, facility managers and engineers alike are turning to radiant snow melt systems as a proactive, long term solution for winter safety and liability reduction.

Slip-and-fall accidents are among the most common liability claims in winter, according to AAA. Winter storms have cost billions of dollars in insured losses, just in the past few years. For businesses, that's a major issue. In healthcare facilities where patient safety and uninterrupted access are non-negotiable, the stakes are even higher. Radiant snow melt systems can eliminate surface ice before it becomes a hazard, dramatically reducing legal exposure.

SAFETY WHERE IT MATTERS MOST

While plowing and salting have long been the standard for winter maintenance, they can't match the precision or reliability of a properly designed snow melt system. These hydronic or electric systems activate automatically, require less manual intervention and provide uniform melting exactly where it's needed most. Other traditional methods, such as chemical deicers, can also be harsher on the environment. Technical Sales Manager of the Midwest and Northeast regions for REHAU, **Jeff Schneider**, told us, "Beyond the issue of liability, automated hydronic SIM solutions also offer significant operational convenience and cost efficiencies by eliminating the need for manual snow removal and reducing reliance on harsh ice melting chemicals or salt, ultimately providing property owners with peace of mind that snow and ice are proactively managed without ongoing manual intervention or premature degradation of surfaces."

According to **Julia Billien**, owner and president of WarmlyYours Radiant Heating, the number one reason that home and business owners, facility managers, and organizations install radiant heating is simple: safety. "We believe no one should have to risk a fall just trying to get to their front door or walk into a place of worship."

A memorable project for the WarmlyYours team was a heated driveway in Bartlett, IL at the Jain Society Temple of Chicago. The project featured the use of the company's snow melting mats, installed with fresh asphalt, as well as a control panel with automatic controls and a manual override. This project was vital to the church, according to Billien. "Their community wanted to make sure that all visitors could arrive safely, no matter what winter threw their way." The snowmelt system installed ensures that roads remain safe for every person who comes to the temple, regardless of the weather.

Rehau installed a hydronic snow and ice melting system for This is the Place Heritage Park in Salt Lake City, Utah. Warm water and/or glycol solution is circulated through a network of pipes embedded in the concrete slabs to melt snow and ice above. IMAGE COURTESY OF REHAU.

Kolyn "Coach" Marshall, senior applications instructor at Watts, also recalled a particular job that was prompted by a need for a safer environment. Eight years ago, the Wellspan York hospital built a new helipad; part of a $50 million modernization of its emergency department. The new heli-pad needed to be able to safely transport patients no matter the weather. According to **Dave Yates**, then president of the firm, "There's an art to maintaining just the right degree of heat within a concrete helicopter pad to ensure that it's free of ice and snow – which can temporarily blind pilots at a time when they're most vulnerable."

Rooftop helipads, while incredibly important, also pose risks to those below, according to Marshall. “We usually focus on the helicopter and the risk flying debris can cause to the helicopter, but this debris also poses a risk to those on the ground below. If a helicopter is able to kick up snow and ice from the roof there is a potential for that debris to be tossed over the roof’s edge and down to those on the sidewalks below.” That’s why snowmelt systems are the ideal choice in cases such as these. “Eliminating the snow and ice before it’s an issue is not only beneficial to the helicopter and those moving to and from, but also to those unaware by-standards on the ground below.”

“According to workers’ compensation experts SFM, 25% of ice and snow-related falls occur in parking lots, so any structure with a parking lot is a good candidate for a snow and ice melting system.” Uponor’s North America Heating and Cooling Category Manager, **Tim Botten**, told us.

Sidewalks, parking lots, hospitals, geriatric facilities, airports and museums – the list goes on of projects that companies have been able to ensure safety through the use of radiant snow melt. When accessibility and operational reliability are on the line, especially for critical facilities, the smartest solutions start from the ground up.

WarlmyYours installed two heated driveways for a temple in Chicago, ensuring that their community could come to worship without fear of icy roads. IMAGE COURTESY OF WARMLYYOURS

THE SUSTAINABLE CHOICE

Safety, while certainly one of the main reasons that many people decide to install radiant snow melt systems, is not the only reason that many are turning to this technology. “While mitigating slips and falls is important, there are also labor costs, equipment costs and sustainability factors that play an important role.” Botten said. The developer of an outdoor mall in Canada, Royalmount, came to Uponor for help with a snow and ice melting system throughout the property that wouldn’t damage the surrounding ecosystem. “Unlike harsh deicing chemicals, a snow and ice melting system quickly and effectively eliminates winter hazards without the need for toxic substances that can harm trees and plants or even be tracked indoors via shoes and boots.”

This project, according to Botten, is the perfect example of using snow melt as part of a broader sustainability plan. “A key component of the project’s carbon neutrality is its use of a dual energy transfer loop primarily powered by geothermal energy. The system uses 150 geothermal wells, which are 600 feet deep, to provide a significant portion of the project's energy needs. Hydronic radiant snow and ice melting systems are ideal for combining with geothermal ground source heat pumps.”

MrPEX recently completed a radiant snow melt project in Downtown Manhattan at a Toyota dealership. IMAGE COURTESY OF MR PEX

Julia Billien of WarmlyYours also mentioned a project that the company worked on: the Illinois Holocaust Museum Education Center. “Their values around sustainability and stewardship come through in everything they do. It made perfect sense for them to integrate a snow-melting system for a heated walkway into their LEED Gold-certified facility.” Sustainability was something very important to this project; that’s why they opted for a heated walkway system. “They understood that a sustainable space is also a safe space. You don’t have to compromise on one to get the other.”

In fact, there are several environmental reasons to consider a radiant snow system instead of traditional methods, like reduction in salt and chemical use. Traditional deicing methods rely heavily on rock salt and chemical agents, which can contaminate groundwater and local waterways or damage surrounding vegetation, soil quality and infrastructure. “By keeping surfaces clear of snow and ice without the need for de-icing chemicals, the system helps prevent environmental runoff and reduces damage to surrounding landscapes and infrastructure,” according to Botten. And, in the words of Billien, “Small business owners are proud that they don’t have to rely on rock salt and prayer to keep their storefronts accessible. When you invest in people’s safety, it shows. You see it in fewer panicked phone calls. Fewer slips. More peace of mind.”

Radiant snow melt systems significantly reduce — and in some cases eliminate — the need for diesel-powered snow removal equipment such as plow trucks, skid steers and snow blowers. This not only cuts down on fuel consumption and emissions, but also reduces the noise and disruption these machines often cause, particularly in dense urban areas or sensitive environments like hospitals and schools.

disruption these machines often cause, particularly in dense urban areas or sensitive environments like hospitals and schools.

Radiant snow melt systems are paramount to keeping businesses running smoothly, no matter what time of year it is. IMAGE COURTESY OF WATTS

In addition to lowering greenhouse gas emissions associated with heavy equipment, radiant systems help preserve the integrity of driveways, walkways and other surfaces. Repeated plowing and scraping can cause physical damage to pavement, concrete and pavers, leading to faster material degradation. Over time, this results in costly repairs or complete resurfacing, which carries its own environmental footprint in terms of materials, machinery and energy use.

By maintaining a consistent, ice-free surface throughout the winter without physical abrasion or chemical corrosion, snow melt systems extend the lifespan of hardscaping. Fewer repair cycles and less frequent resurfacing mean less construction-related waste, fewer emissions from manufacturing and transport of replacement materials, and reduced demand for landfill space. It's a long-term sustainability win — minimizing both environmental impact and maintenance costs over the life of the surface.

WHAT'S NEXT IN RADIANT HEAT?

While radiant snow melt technology is already quite the feat, companies aren't resting on their laurels. They're recommending technology that takes things a step further. At Watts, WarmlyYours, Uponor and Rehau, the recommendation is the same: control. "Utilizing a control system that has internet-based connectivity for up-to-date weather forecasting as well as moisture sensors that can detect moisture and turn the system on/off based on [the results] is critical to a well performing SIM system that is using energy only when needed." Rehau's Jeff Schneider told us.

"Instead of heating everything at once, a zoned control lets you prioritize. Let's say a business has both a walkway and a staircase. If elderly visitors or customers with mobility concerns are common, you can choose to heat the stairs first – because that's where the risk is greatest. . . Where are the danger zones? Where are people most likely to walk? That's how you get both safety and efficiency in one package." Said Julia Billien of WarmlyYours.

Watt's Kolyn "Coach" Marshall also noted that there are several control strategies available now. "The basic format includes a slab sensor with snow detection capabilities. These operate on an as-needed basis. The sensor detects snowfall and turns on. . . When the sensor no longer detects snow, the control enters its off cycle, which generally consists of a certain amount of post-operational runtime to help prevent any remaining water from re-freezing." While these systems work well, according to Marshall, they can be slow. " A more advanced, or smart, system involves connecting the control to the internet. This allows the controller to interface with the local weather reports. If snow is predicted, the controller will preemptively turn on a few hours before the anticipated snowfall is to begin. This allows the slab to be at melting temperature when snowfall begins, reducing or eliminating the delay and any snow or ice accumulation."

> "BY MAINTAINING A CONSISTENT, ICE-FREE SURFACE THROUGHOUT THE WINTER WITHOUT PHYSICAL ABRASION OR CHEMICAL CORROSION, SNOW MELT SYSTEMS EXTEND THE LIFESPAN OF HARDSCAPING. . . IT'S A LONG-TERM SUSTAINABILITY WIN — MINIMIZING BOTH ENVIRONMENTAL IMPACT AND MAINTENANCE COSTS OVER THE LIFE OF THE SURFACE."

"While these systems can be used with manual, timed, or automatic controls, sophisticated smart systems that optimize melting and energy consumption are the best solution to ensure immediate response while maximizing system efficiencies," Uponor's Tim Botten agreed.

With innovations like internet-connected weather forecasting, zoning capabilities and real-time moisture sensors, today's systems are designed to deliver targeted performance with minimal energy waste. As technology evolves, the integration of smart controls ensures snow melt systems work not just harder, but smarter — enhancing both safety and sustainability, right when and where it matters most.

For many people, snow is little more than a seasonal inconvenience. But, for hospitals, businesses and institutions where safety and accessibility can't wait for a plow truck, it's a serious risk: one that demands a serious solution. Radiant snow melt systems offer more than just convenience; they deliver peace of mind, operational resilience and a measurable reduction in liability, labor and environmental impact.

With the growing emphasis on sustainability, smart controls and year-round facility preparedness, it's clear that snow melt technology is so much more than just a luxury. It's an investment in the future. As more organizations move toward proactive winter readiness strategies, radiant systems are proving that the safest, smartest solutions really do start beneath the surface.

ABOUT THE AUTHOR

Kristen Bayles is the Associate Editor for *Plumbing & Mechanical* and *Supply House Times*. Originally from Monroeville, Alabama, her family worked in the plumbing industry for many years. Kristen holds a Bachelor's degree in English with a specialization in Language and Writing from the University of Montevallo. Prior to joining BNP in 2025, she worked as an editor in the jewelry industry.


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• Removable check valves in inlet fittings
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Set the maximum temperature for a group of fixtures
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HIGH EFFICIENCY HYDRONIC UPGRADE BRINGS 150-YEAR-OLD HISTORIC FACILITY INTO THE NOW

BUILDING FROM 1867 RENOVATED WITH MODERN HYDRONIC SYSTEM TO BETTER SERVE CHILD WELFARE ORGANIZATION.

By **Derrick Oberdorf**

Plummer Youth Promise embarked on a mission to steward the property through sustainability and environmental initiatives—including plans for a new facility and to expand its services to additional youth, as part of a two-year $25 million capital improvement project.
IMAGES COURTESY OF XYLEM

Driving energy efficiency in commercial buildings is a delicate balancing act. Between the equipment selection process, choice of partners and structural considerations, a fair amount of foresight must go into a project's overall system design.

This was evident at Plummer Youth Promise, a cornerstone establishment on Winter Island, a 54-acre peninsula situated just northeast of Salem, Massachusetts. The 150-plus-year-old child welfare organization is renowned as much for its history as for the services it provides to this small, historic community. Driven by the sheer age of the building and a desire to keep modernizing its facilities and continue serving residents, Plummer Youth Promise embarked on a mission to steward the property through sustainability and environmental initiatives — including plans for a new facility and to expand its services to additional youth, as part of a two-year $25 million capital improvement project.

When considering restoration initiatives of the existing building, as well as the construction of the new residential facility, it was just as much about preserving the structural integrity as it was about complying with modern-day expectations for improved occupant comfort, energy efficiency and adherence to evolving regulations and standards, particularly considering the already temperamental heating system and cramped lodging.

Watermark is Xylem's corporate social responsibility program. Our mission is to provide education and equitable access to safe water and sanitation to support healthy lives and help build resilient communities.

THE RIGHT EQUIPMENT—AND PARTNERS—MAKE ALL THE DIFFERENCE

According to **Chris James**, application engineer with New England supplier Fluid Industrial Associates (FIA) and one of the partners on the project, many technical considerations were evaluated during the initial planning phase. In addition to structural-related damage, the HVAC system upgrade required navigating how to fit a large number of pumps into three relatively small mechanical spaces. It also required identifying a more sustainable and economical option to heat and cool its facilities—all while adhering to the required three feet of clearance in front of electrical equipment, as stipulated by the National Electric Code (NEC).

Xylem's hydrovar X-enabled smart pumps were selected for their compact design, intuitive programming and ease of serviceability. Like traditional variable frequency drive (VFD) pumps, these adjust motor speed based on a set point. Unlike traditional VFDs, though, Xylem's design offers additional control features, including a guided tool that takes users through the startup process and the ability to set alarm thresholds that protect the application from something going wrong, such as ramping up or down or turning off and on.

"What we have done is embedded our own proprietary software tailored around pumping applications and paired it with a startup Genie. Based off the user's input, it's going to set hundreds of different parameters behind the scenes to make it nice and efficient for them," noted **Derrick Oberdorf**, Americas product manager, Xylem.

What's more, no wiring between the motor and VFD makes it easy to separate the two and easily replace one or the other, driving solution longevity.

REAL RESULTS, MEASURED IN REAL-TIME

Now, the original residential facility—built in 1867—features a modern hydronic heating and cooling system. Knowing that water is 3,500 times more efficient at transferring heat than air doesn't hurt, either.

In addition to a high-efficiency heating and cooling system, contractors on the project drilled nearly 50 geothermal wells over 300 feet into the ground, an addition that brings nearly 400% to 500% efficiency to the facility. What's more, long-term operating and maintenance costs are projected to be reduced by approximately $7 million compared to traditional systems.

In a solar-powered geothermal system, heat is harvested from the ground to efficiently exchange warm and cool air. A typical geothermal system consists of the ground heat exchanger, the heat pump unit and the air delivery system. This means that selecting the right equipment is instrumental in ensuring that the system runs at peak performance over time.

Xylem's hydrovar® X-enabled smart pumps were selected for their compact design, intuitive programming and ease of serviceability.

In the case of Plummer Youth Promise's system, **Larry Lessard**, director of Achieve Renewable Energy (ARE), which led the HVAC design and installation, echoed this, stating: "Xylem's pump system is incredibly important because it would be a shame to have all that efficiency and then have it dragged down by inefficient pumps."

COLLABORATION LEADS THE WAY

Aesthetically speaking, proper selection and sizing of equipment can help maintain the inherent structure of a historic building. From a more technical standpoint, taking the time to choose the right equipment can reduce initial costs and increase long-term operating efficiency. After all, there's a reason why standards like ASHRAE are routinely evaluated and updated to dictate minimum energy performance in HVAC systems. In our industry, there is no such thing as not evolving.

Facility managers, consulting specifying engineers, building owners and more are all too familiar with these expectations and often tasked with the impossible: how do you work within the parameters you have but stretch your design to meet modern-day design requirements? While it's not every day we get to confront this very question with a building as old as 150 years old, it became evident at Plummer Youth Promise that the answer lies in collaboration to advance modern-day heating and cooling solutions. Andrew Pratt, FIA Inc. president, echoed this, offering that projects of this nature are beneficial in providing context for the work they do: "It gets us an opportunity to get out and engage with the end user and understand truly how the equipment that we size and select benefits facilities and programs like this."

"At Plummer, we believe every young person deserves a family that's there for them long-term," said Jessica Norton, community partnerships manager, Plummer Youth Promise. "Creating a space where they feel supported and connected to the environment is a big part of that. Partners like Bell & Gossett and FIA are supporting our mission through their hard work and dedication to the people we serve."

Just as the waves of Plummer Youth Promise's waterfront setting set the tides for a tranquil and therapeutic environment for the children it supports, so too did the equipment process set the tides for a system design that has set Plummer Youth Promise on the path for another successful 150 years.

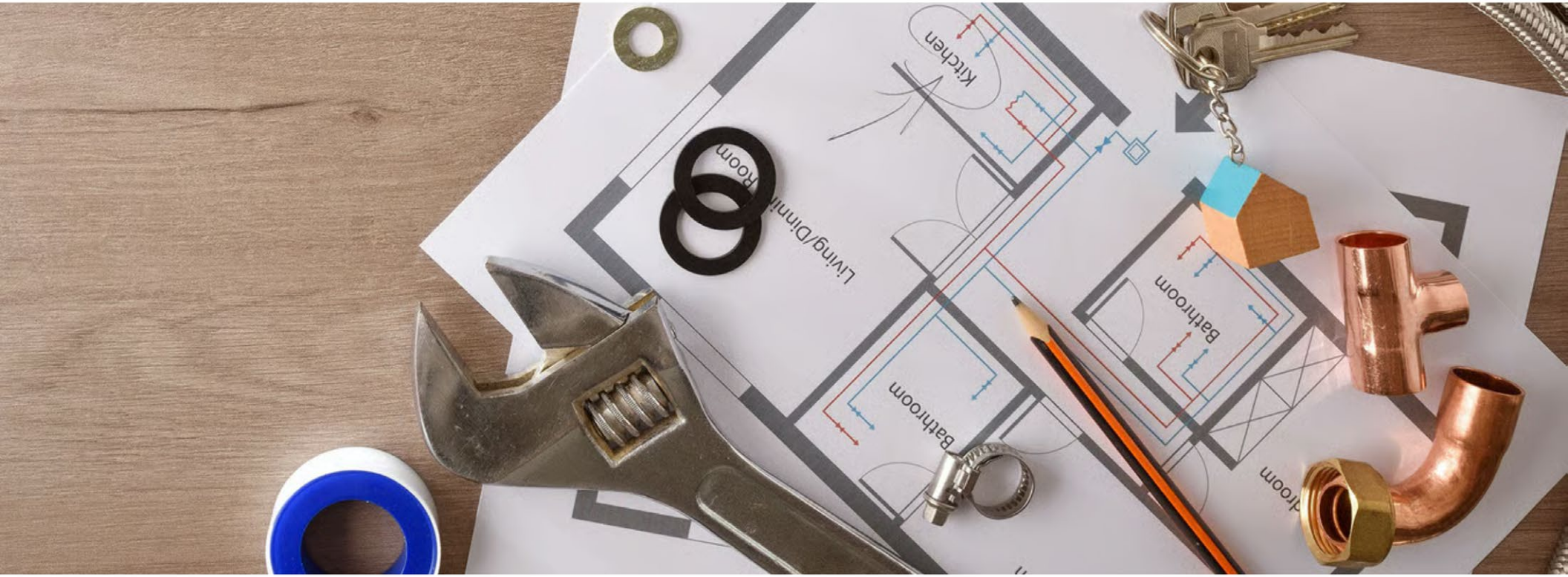
ABOUT THE AUTHOR

Derrick Oberdorf is the Regional Product Manager, Monitoring & Controls for Xylem's Americas region. In this role, Oberdorf is responsible for executing the regional product strategy, including variable frequency drives, condition monitoring devices/ solutions, control boxes and soft starters.

DESIGNING FOR PERFORMANCE

THE ROLE OF ENGINEERING SERVICES IN RADIANT PROJECTS.

By Fae Champagne-Walls



DAVIZRO / ISTOCK / GETTY IMAGES PLUS

A crucial factor in the success of any radiant project is the engineering that goes into the design, installation and testing of the system. As a result, partnering with a quality engineering services team is essential to developing high-performance systems.

These teams, made up primarily of mechanical engineers, support the entire technical lifecycle of a radiant project and are instrumental in everything from accurate materials lists to full schematics for installation and more. Their expertise ensures efficient long-term operation of radiant systems and provides a wide range of benefits to commercial, industrial, marine and residential radiant projects.

Engineering services specify materials for pipes, valves and heat sources to meet project requirements, budget and anticipated lifespan. PHOTO COURTESY OF VIEGA.

WHAT DO THEY DO?

An engineering services team will be key to answering these project questions:

- Is this radiant system technically sound?
- Is it energy efficient?
- Will it be comfortable for occupants?
- How cost-effective will the system be long-term?
- Will the system integrate seamlessly with other building systems?

In answering these questions, their work will fall into several main categories:

System Design and Optimization – Load calculations ensure the system delivers the right amount of thermal energy; loop layouts support even temperature distribution and comfort; and zoning strategy enhances system control and efficiency.

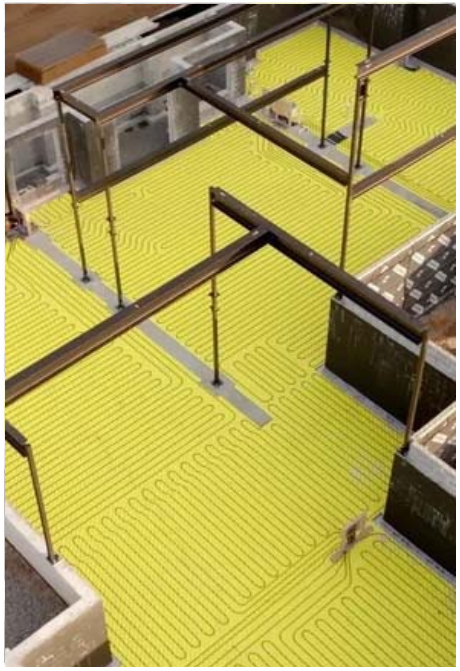
Energy Efficiency – From pump and boiler sizing for maximized energy use and performance to system integration with thermostats, sensors and control panels for reduced energy consumption, engineering services will look for ways to enhance overall energy efficiency.

Code Compliance and Safety – Every system must meet local codes and safety standards around pressure ratings, backflow prevention, proper insulation, pipe materials and safe operation standards.

System Integration – Radiant systems have to work in tandem with ventilation, hot water and other HVAC systems. System controls must also integrate with building automation systems, smart scheduling and remote monitoring.

Material and Equipment Selection – Engineering services specify materials for pipes, valves and heat sources to meet project requirements, budget and anticipated lifespan.

Installation Support and Documentation – From construction drawings, documentation and system testing, engineering services verify performance and correct operation issues.



The installation included 5,500 sq. ft. of Rapid Grid under the basement slab and 9,500 sq. ft. of Climate Panels upstairs. PHOTO COURTESY OF NEXTGEN PLUMBING, HEATING & COOLING

Troubleshooting – Assessing and correcting issues throughout the life of the system.

With all the parts of a radiant system project that an engineering services team will be touching, it's important to take the time to find a team that you trust and one that has a proven track record for quality work.

CUSTOMER-FOCUSED SOLUTIONS

For example, at Viega, their **engineering services** are an invaluable resource for contractors, engineers and wholesalers. The team's collaborative approach, detailed material lists and labor comparisons ensure that projects run smoothly and efficiently.

“Viega's engineering services have received positive feedback from clients. Contractors appreciate the detailed material lists and the time savings associated with using Viega products,” said **Scott Carder**, Viega Piping Systems Engineer. “Accurate material take-offs help contractors avoid discrepancies between estimating software and actual project needs.”

NextGen was involved with a 15,000 sq. ft. custom home that featured a comprehensive radiant system. PHOTO COURTESY OF NEXTGEN PLUMBING, HEATING & COOLING

SUCCESS STORY: RADIANT PROJECT HIGHLIGHT

A notable radiant project is in the heart of Colts Neck, New Jersey, where **Dylan D’Amato**, co-owner of NextGen Plumbing, Heating, and Cooling, is changing the game with residential radiant system installation using Viega Climate Panels and Rapid Grid.

NextGen was involved with a 15,000 sq. ft. custom home that featured a comprehensive radiant system. The installation included 5,500 sq. ft. of Rapid Grid under the basement slab and 9,500 sq. ft. of Climate Panels upstairs.

D'Amato shares, "Two guys, two days, over 8,000 feet installed. It was well worth the investment." Viega's systems provided a streamlined, efficient radiant solution while a massive boiler room was set up with custom manifolds. "The boiler room is really changing the game," D'Amato says. "It's clean, articulate, and uses techniques that have been around for a long time but are now perfected."

D'Amato emphasizes the labor and cost-saving benefits of Viega products, highlighting their durability and reliability. "With proper pipe prep, Viega has the best product on the market. It always upholds the standards of the application we're using it in."

This is just one example of a unique project that an engineering services team can support in creating a result that exceeds client expectations. Take the time to find a team that you trust and experience for yourself how working together will result in an efficient, high-performance radiant system.

ABOUT THE AUTHOR

Fae Champagne-Walls is the public relations manager for Viega, a subsidiary of The Viega Group, which has more than 125 years of experience in building technology. Viega is the global market leader in metal piping systems, serving the industrial, commercial and residential markets. For more information about Viega, visit viega.us.

ADDRESSING COMMON MISCONCEPTIONS ABOUT RADIANT COOLING

COVERING IDEAL CLIMATES AND DESIGNS.

By Saeed Danesh

300,000 feet of RAUPEX pipe was installed in the University of Chicago Campus North Residence Commons. The temperature of the student living quarters is maintained via REHAU in-slab hydronic radiant heated and cooling. IMAGE COURTESY OF SUSAN KIRT PHOTOGRAPHY LLC

One of the most persistent misconceptions about radiant cooling is that it inherently leads to condensation problems and that it can't be used in humid climates. However, with the right design and control strategies, radiant systems can operate reliably and efficiently, even in high-humidity regions.

Radiant cooling systems function by absorbing heat from a room primarily through radiation and some convection. However, unlike all-air systems, they do not handle latent (moisture) loads, that's why they are often part of Hybrid Systems, most often paired with a Dedicated Outdoor Air System (DOAS). The DOAS addresses latent load, controls humidity, and meets fresh air requirements per ASHRAE Standard 62.1.

Condensation forms when a chilled surface drops below the dew point. The key to preventing this is to ensure that all radiant surfaces always stay above the space's dew point. This is not a limitation of the climate, it's a matter of design and control.

FOUR KEY STRATEGIES TO MITIGATE CONDENSATION RISK

1. Tight Building Envelope
Preventing warm, moist outdoor air from leaking into the building is the first line of defense. A well-sealed envelope reduces unpredictable humidity loads and supports more stable indoor conditions.

2. Dew Point Based Control Strategy
Demand based control with dew point monitoring is essential. Sensors should monitor both temperature and humidity, allowing chilled water temperatures to adjust dynamically and keep surfaces safely above dew point.

3. Safe Surface Temperatures
ASHRAE Standard 55 recommends keeping radiant surface temperatures above 66°F (19°C) for cooling. Staying in this range ensures comfort and avoids surface-level condensation, while still delivering effective cooling.

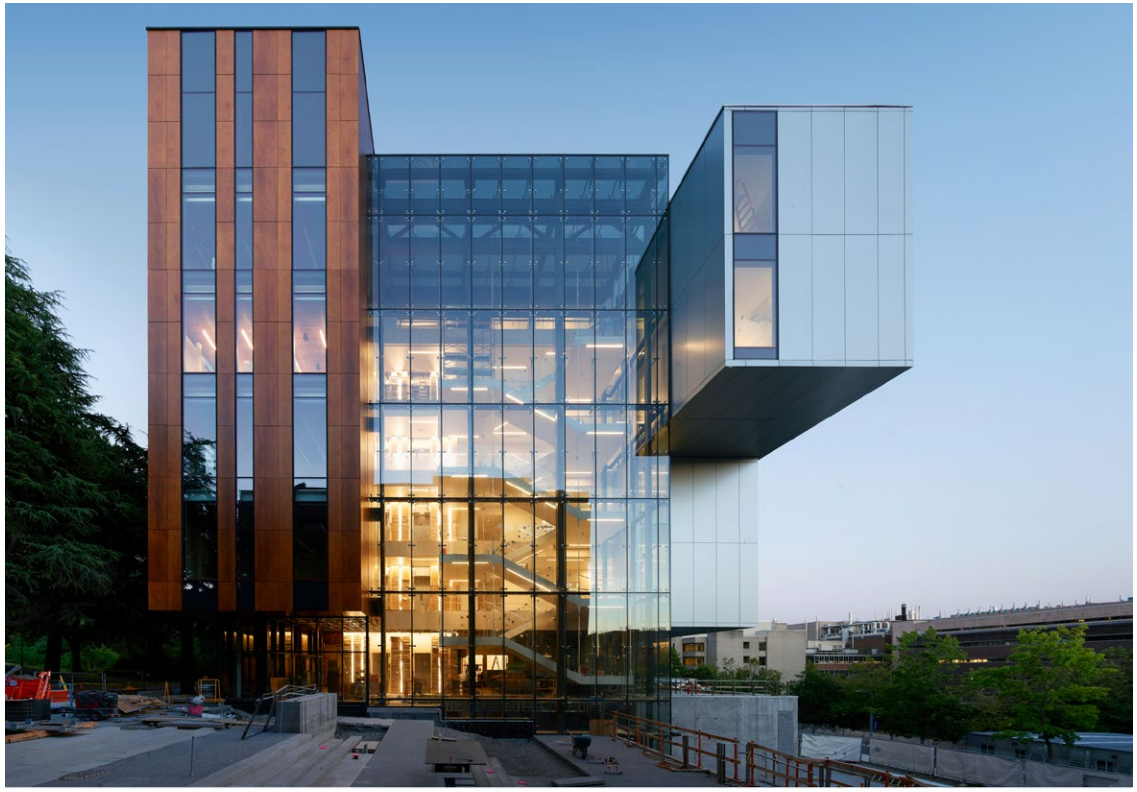
4. Maintain a Dew Point Buffer
A simple, effective rule: supply water temperatures should be at least 3°F (or ~1.5°C) above the space's dew point. This safety margin allows the system to operate without risking condensation, even during temporary spikes in humidity.

RADIANT COOLING SYSTEM EFFICIENCY AT A GLANCE

Beyond condensation, radiant cooling is also widely misunderstood in terms of its efficiency and controllability. These systems often outperform traditional cooling methods in both energy efficiency and comfort, especially when integrated into a well-coordinated HVAC design.

A New Buildings Institute research study of site energy use in 23 radiant buildings found: Radiant buildings are more energy efficient than 90% of comparable buildings, with 2/3 receiving an EnergyStar score of 90 or above.*

Radiant cooling can operate at higher chilled water temperatures; typically, 55–60°F (13–16°C) versus 42–45°F (5–7°C) in conventional air systems. This translates to less chiller energy required for cooling. In some designs cooling tower temperatures are enough to supply the radiant systems. **Bonus**: A great match for heat pumps which make radiant systems a great choice supporting electrification goals and increasing LEED potential for *Optimize Energy Performance*.



49,000 feet of RAUPEX pipe was installed in the University of Washington Life Sciences Building. Because of the high solar gains of floor-to-ceiling windows, the radiant system was installed in the concrete slab on the southern and northwestern sides of the building, primarily for main entrances, lobbies, coffee shops, seating areas, professors' offices and graduate student work areas. IMAGE COURTESY OF KEVIN SCOTT.

Additionally, radiant systems reduce or eliminate the need for large volumes of cooled air to be pushed through ductwork. This leads to significant reductions in fan energy, which can account for up to 25% of a building's total electricity use. **Bonus**: Smaller ducts mean more architectural freedom. This also helps earn LEED and WELL points for *Daylighting and View*.

Ventilation and humidity control are still needed, but sensible loads are significantly reduced with radiant cooling. That means smaller ductwork, AHUs, and cooling coils. In many cases, a compact DOAS is sufficient to handle both ventilation and latent loads, resulting in lower equipment footprint, reduced energy use and easier maintenance.

Thermal mass and "Slow Response" can be a benefit. Thermal mass allows buildings to maintain comfort over time with minimal system cycling, reducing peak load demands and energy use. It also helps align cooling operation with off-peak hours or renewable energy availability. **Bonus**: Helps with grid harmonization and renewable energy use, contributing to LEED and electrification goals.

SMART DESIGN, SMARTER PERFORMANCE

Radiant cooling systems offer not just energy efficiency, but also exceptional zoning and control flexibility. Each zone can be independently managed using thermostats, actuators, and sensors that respond to occupancy, internal heat gains, and usage schedules.

This zoning capability allows for precise temperature control across different areas. By decoupling fresh air and cooling demand, when integrated into hybrid systems, it helps enhance occupant comfort and avoid energy waste. These systems adapt easily to dynamic conditions, whether it's a classroom full of students during the day, an office with shifting peak hours, or a multi-use space with variable occupancy.

Advanced controls also allow for system optimization over time, adjusting water temperatures, flow rates, and sequencing based on real-time building data. This makes radiant systems ideal for smart buildings, schools, offices, and any high-performance project prioritizing comfort, flexibility, and long-term efficiency.

RETHINKING RADIANT COOLING

Radiant cooling is not limited to dry climates or niche applications. With a proper design, it becomes a versatile and energy-efficient solution suitable for a broad range of commercial and institutional buildings. With strategies to avoid condensation, proven energy performance and high comfort levels, radiant cooling systems offer various benefits that traditional systems can't easily match. As electrification and decarbonization goals continue to shape building design, radiant cooling is well-positioned to be a part of that future.

** Energy Use, Occupant Surveys and Case Study Summary: Radiant Cooling and Heating in Commercial Buildings, New Buildings Institute and Center for the Built Environment, 2017*

ABOUT THE AUTHOR

Saeed Danesh is the Technical Project Specialist, Radiant Heating and Cooling at REHAU

PRODUCTS

NEW RADIANT & HYDRONIC PRODUCTS

THE LATEST PRODUCTS TO HIT THE RADIANT & HYDRONIC MARKET SO FAR IN 2025.

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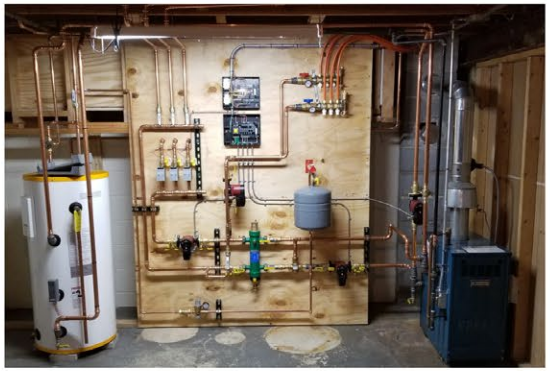

Caleffi's SEP4™ is the smarter way to protect and simplify hydronic systems. This multifunction separator combines four critical functions in one compact device: hydraulic separation, air elimination, dirt separation, and magnetic separation. The result? Faster installation, reduced maintenance, and long-lasting system efficiency. Featuring a powerful rare-earth magnet, internal mesh for micro-bubble removal, and robust construction, the SEP4 delivers dependable performance for the life of the system. Simplify design, save labor, and safeguard comfort, all with one innovative solution.

www.caleffi.com

WEBSTONE
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Webstone's G-Series products save space on the shelves, in the truck, and in the field. The G-Series x press line is specifically designed with the press installer in mind, with lead-free, dezincification-resistant brass valves that incorporate both G-thread and integrated press ends for seamless transitions. Installers can choose from a wide array of G-Union end connections and sizes, including optional accessories for a completely custom configuration.

www.webstonevalves.com

MRPEX
RADIANT FOAM PANELS

MrPEX's foam panels are Innovative engineered for superior performance and designed to optimize heat distribution, ensuring comfort in every corner. Save time and money with easy-to-install panels that seamlessly integrate into any radiant flooring system. The user-friendly design streamlines the installation process. The foam panels also maximize energy savings while minimizing environmental impact. Built with efficiency in mind, delivering warmth while keeping utility costs down. Crafted from high-quality materials, MrPEX panels are built to last for long-term reliability. Foam panels are adaptable to various floor types and heating requirements, whether residential or commercial.

www.mrpexsystems.com

AERCO
EV INDIRECT WATER HEATER LINE

AERCO announced the expansion of its SmartPlate EV indirect water heater line with the addition of new high-flow models, capable of supporting domestic hot water loads up to 140 gallons per minute. Designed to pair with condensing and electric boilers – including seamless integration with AERCO's Benchmark and Benchmark E boilers – the new SmartPlate EV models offer greater performance flexibility. The SmartPlate EV line is engineered to complement low-temperature hydronic systems. By using boiler water temperatures as little as 5°F above the required DHW set point, SmartPlate EV reduces radiation losses and drives overall system efficiency.

www.AERCO.com

RHEEM
COMMERCIAL AND RESIDENTIAL BOILER LINE

Rheem is adding to its portfolio of boilers with the unveiling of its FT Series. The new line will meet a variety of heating needs, making it a versatile and efficient choice for homes and businesses. The FT Boiler Series features advanced condensing technology, ensuring superior performance with up to 95% AFUE. Additionally, Rheem has made installation, operation and maintenance easier by incorporating an intuitive full-color touchscreen display, four zone control capability, safety features and a compact design. These units are ideal for space heating applications, including hydronic radiant heating, and pair with Rheem STID Series Indirect Tanks for a high performance domestic hot water solution. Featuring an ultra-low NOx burner, the FT Series boilers help reduce greenhouse gas NOx emissions by up to 75% compared to minimum efficiency boilers and by up to 65% compared to standard residential tanks.

www.rheem.com

TACO
ZONE CONTROL HYDRONIC SYSTEM

Taco's Next Generation Zone Controls are upgraded with the features and streamlined design elements requested by installers. These new zone controls offer versatility and performance, making it easier than ever to manage and optimize your system's operation. The company's enhanced product line now includes switching relays, zone valve controls, priority zoning for circulators and pumps and fan controls, providing everything you need for improved efficiency and reliability in a single, integrated solution. Taco's Next Generation Zone Controls offers diagnostic lights, simplified wirings, Smart Plus Logic for DHW recirculation, priority protections features and expanded functionality with Taco Control Mobile App. Taco Zone Controls are designed for versatile applications, including hot water heating systems, closed cooling circuits, air conditioning, hydronic heating and cooling, solar, and geothermal systems.

www.tacocomfort.com

LOCHINVAR
AIR TO WATER HEAT PUMP

Lochinvar launched a space heating and cooling appliance – the Centrus air to water hydronic heat pump (AWHP). It is a compact unit that supplies water for heating, cooling and domestic hot water needs. The product is designed with contractors and homeowners in mind. Centrus comes equipped with ComfortLoch technology to ensure a high heating capacity even at low ambient temperatures. The dual-pipe heat exchanger and two expansion valves allow for an efficiency-optimized refrigerant two-loop system that maintains heating capacity during temperatures as low as -4°F. It can provide output temperatures of up to 149°F. The system is compatible with standard North American accessories, including a 24V external thermostat, 120V external water pump and 24V two-way and three-way valves. A monobloc design keeps the low GWP R32 refrigerant contained inside the unit, preventing any refrigerant from entering the living space. It also features backup boiler functionality.

www.lochinvar.com

WEIL-MCLAIN

HYBRID DUEL-FUEL HYDRONIC HEATING SOLUTION

Weil-McLain has introduced its new ECO HP Air-to-Water Heat Pump designed for residential and light commercial applications. The new system is a key component of the ECO Hybrid Dual-Fuel Hydronic System, which combines the efficiency of a heat pump with the reliability of a traditional gas boiler to deliver energy-efficient gains and consistent comfort.

www.weil-mclain.com

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