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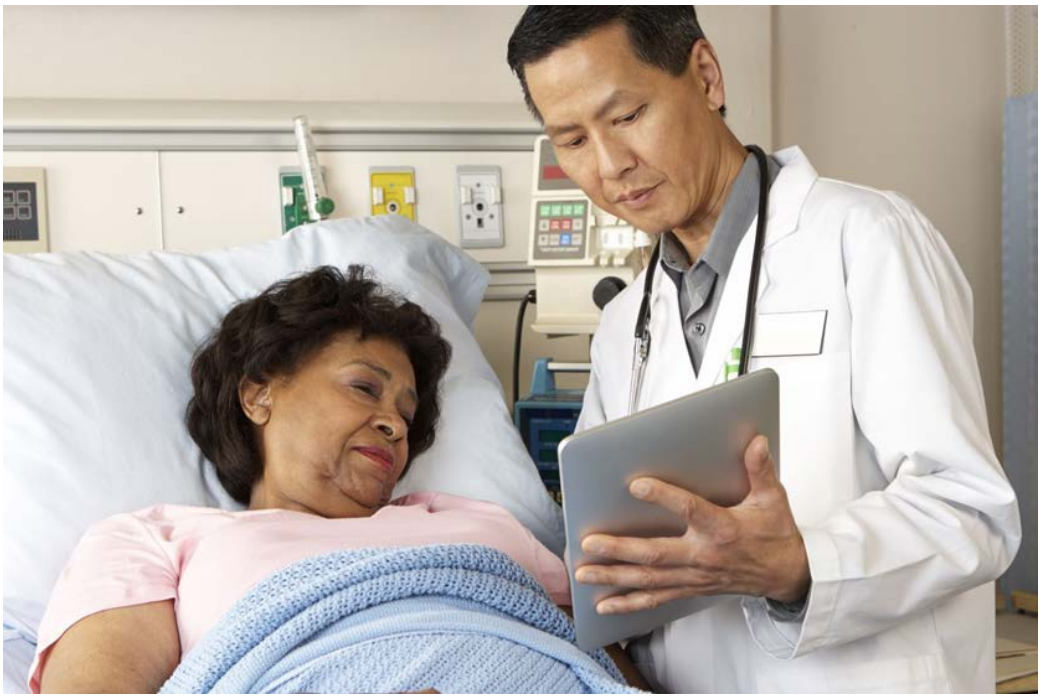
What Does the Future Hold?

The very first installation in the U.S. of a Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric) Variable Refrigerant Flow (VRF) zoning system was in a health and wellness facility. Over a decade has passed since Hospice Savannah, Savannah, Georgia, started enjoying its individually operated zones and quiet system. During that time, Mitsubishi Electric VRF zoning systems have been installed in numerous health and wellness facilities, and have gained strong support in the field. Mitsubishi Electric continues to monitor trends and developments in this important arena and has identified the following six trends impacting architects in the health and wellness sector:



Trend #4: The role of technology in health and wellness facilities will go beyond operating rooms.

1. **Effects of an aging populace.** Pew Research Center says that, by 2030, 18 percent of the U.S. will be 65 or older. The adaptations that will take place in health and wellness facilities go beyond safety and into profound details. Examples include creating an aesthetic for a populace whose eyes process colors as more yellow, or creating wayfinding cues that offer patients and visitors seamless navigation.
2. **An appetite for data.** Interest in evidence-based design has grown significantly, especially in the health and wellness industry, given its often life-or-death nature. Architects are using environmental assessments when designing patient spaces, for example working with data to identify the best flooring. A key idea is one of research *before* design rather than *after*, such

that data can be used to evaluate project goals.

3. **Elegance without extravagance.** The pressure is on for architects to design health and wellness facilities that are inexpensive, yet elegant. Patients want to see landscaping, natural light and thoughtful spaces. Owners want to keep profit margins up. The result is a Goldilocks balance, in which designs must be elegant enough to satisfy patients but not so elegant as to indicate overspending.

4. **Newer technology. More technology.** Patient rooms are no longer just a bed and bathroom, but a meeting of human and technological offerings that improves the patient experience. Nurses visiting patients can now record information on tablets as a way to extend the human interaction, instead of leaving the patient and recording notes in a far-off workstation. Technology is also increasingly being used to reduce noise and falls; wearable sensors, for example, can predict and prevent slips.

5. **Diversity in the industry means diverse designs.** Staff members of health and wellness facilities are diverse in age, ethnicity, religion and skill. Architects planning health and wellness facilities are now using diversity as a design driver when determining what workspaces are best suited for staff.

6. **Various needs mean flexible spaces.** Budgets are important, but as they get tighter, designers are being asked to offset less money with more creativity. An increasingly explored creative technique is to design with multi-use in mind. Architects are planning spaces that can be reconfigured quickly and easily, allowing facilities more flexibility.

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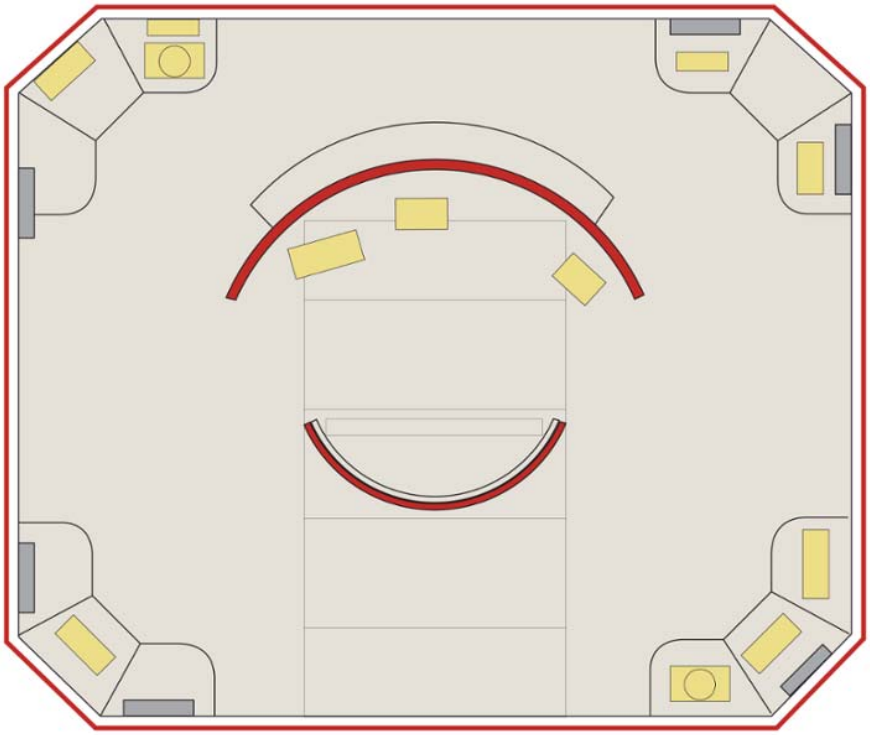
2015 AHR Expo Celebrates Amazing Innovation

More than 2,100 exhibitors and 60,000 building professionals gathered in Chicago from January 26-28 for the largest event in the HVAC/R industry, the 2015 AHR Expo. Attendees participated in three days of networking, educational programs and exposure to the latest trends in the industry.

At the Mitsubishi Electric US, Inc. Cooling & Heating Division booth, visitors learned about exciting new products and technology – the **first** residential multi-zone unit for use in extreme cold climates and the **most energy-efficient** ductless system on the market.

Take a virtual tour of Mitsubishi Electric's booth at the 2015 AHR Expo by clicking the icons below.



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Curvilinear Design: Meet Mitsubishi Electric VRF Zoning Systems

The Plateau Valley Hospital District (PVHD), Collbran, Colorado, traces back to a 1903 community effort to meet the maternity needs of local women. The PVHD hospital was housed in an 8,000-square-foot homestead for decades, but in 2010 the PVHD board decided the hospital had outgrown the space. The board selected Wagner/Galloway Architects LLC (Wagner/Galloway) from nearby Palisade, Colorado, to plan and design the new facility.

The Plateau Valley Medical Center underwent a redesign featuring curvilinear walls.

Wagner/Galloway designed a dramatic 6,400-square-foot, curvilinear clinic building for around-the-clock care, with an emergency room, five examination rooms, lobby, nurse's station and offices. "Curves can create a calming effect," Frank Wagner explained, "so we created a radius-intensive design that we felt fitting for a health care facility." The emotional effect of curvilinear design is well-studied, and the use of it in a health and wellness facility works particularly well given curvilinearity's power to transform what can otherwise be an impersonal or restrictive space into a space of inspiration and movement.

The curvilinearity of the building also produced unique mechanical system requirements. The hospital needed an HVAC system that did not interfere with the space's aesthetic and allowed for individual temperature controls in each room. The system had to be quiet and comfortable as well as super efficient to minimize energy costs. The system also needed to meet budget, space and energy-usage constraints.

Wagner/Galloway enlisted Bighorn Consulting Engineers, Inc. (Bighorn) in Grand Junction, Colorado, as the mechanical engineers for the project. Shawn Brill, founding partner of Bighorn, said that selecting a Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric) Variable Refrigerant Flow (VRF) zoning system as Plateau Valley's HVAC system was a "no brainer." Bighorn had installed such systems in several local buildings, including the Hospice & Palliative Care of Western Colorado administration facility in Montrose, Colorado.

Brill explained why he specified Mitsubishi Electric's R2-Series system — the only two-pipe heat-recovery system that simultaneously cools and heats. "I admire this technology because of its excellent energy performance, flexible zoning capability and ability to load share." Brill also touched on the selection of a VRF system as a way to retain the character of the curvilinear design: "The architect designed this classy building. We couldn't have ductwork hanging out of the walls." Using VRF zoning systems meant units were unobtrusive, and could be discreetly located in ceilings or closet space to preserve the curved walls' flow.

Mitsubishi Electric indoor units blend in visually and aurally to improve Plateau Valley patients' experience.

The combination of an innovative, engaging building design with key features like a VRF zoning system coalesced into a facility that could fully serve its purpose.

To view the full version of the case study, click here.

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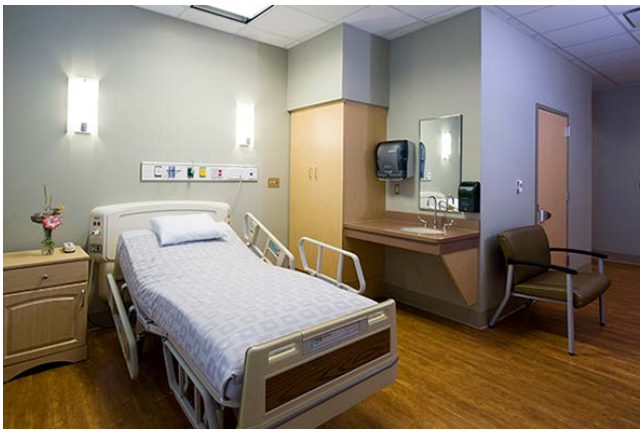
When Designing a Hospital, Patient Comfort Comes First

Choctaw General Hospital's 44,000-square-foot addition.

"I was with a patient today whom I have to move to Alabama's largest [800-bed] hospital," said J.W. Cowan, administrator, Choctaw General Hospital (Choctaw), Butler, Alabama. "[The patient] remarked, 'I don't want to go because they always keep it cold and I know I will be uncomfortable. Here, my room is always at the right temperature.'"

Cowan's number one priority is patient care. A 2012 renovation of the 74,000-square-foot critical access hospital made that priority a lot easier to address; the architects selected Variable Refrigerant Flow (VRF) zoning systems from Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric) as the HVAC solution. VRF zoning technology has since been providing the comfortable environment that Cowan's patients greatly appreciate. "I have never had one patient complaint because this Mitsubishi [Electric] system is such a good fit with hospitals. The indoor units are so quiet the patient is not aware they are operating," said Cowan. This was no exaggeration; the indoor units rate between 19 and 34 decibels; a whisper comes in at 35 decibels. Such a quiet system eliminates the distractions of loud fans and allows the staff to focus on more important matters. "And the individual room controls are so precise my patients are always comfortable," said Cowan.



One way to boost patient comfort is through a smart HVAC system.

With a VRF system, each patient can have his room at his own "right" temperature, whether soothingly warm or refreshingly cool. This is possible because of zoning technology, in which each zone can operate at its own climate, with the system simultaneously cooling some zones while heating others. Zoning technology ultimately means that facilities can be designed to serve a wide diversity of people, which is central to health and wellness facilities' mission.

The VRF zoning system also resulted in lower

energy costs for Choctaw. “When I look at my monthly energy bills, I am shocked at how affordable my costs are — especially during the peak summer and winter months,” Cowan continued. “I attribute this largely to the energy-saving aspects of my Mitsubishi [Electric] system.”

To view the full version of the case study, click here.

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How VRF Zoning Systems Meet the Strict Design Needs of Health and Wellness Facilities

Hospice Savannah installed VRF zoning systems to meet its patients' needs for a peaceful stay; engineer Charles VandenBulck said, "Overall, there is a great sound of silence."

Variable Refrigerant Flow (VRF) zoning is a flexible, cost-effective and environmentally friendly HVAC option. According to *The Air Conditioning, Heating and Refrigeration NEWS*, VRF zoning is currently the fastest-growing segment of the U.S. HVAC market. VRF zoning systems work well in all building designs (e.g., commercial, residential, industrial), turning the usually cumbersome and expensive process of trying to cool and heat a building that has multiple floors and zones into something easy and cost-effective.

VRF zoning allows each area to be controlled separately, with one zone being cooled while another is heated. This is possible with technology from Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric).

VRF systems are especially effective in health and wellness facilities, such as hospitals, hospices and clinics. These facilities have strict needs that arise from balancing running a business with serving an unhealthy population. **Below are five needs that architects should consider when designing a health and wellness facility** and information on how VRF technology meets those needs.

1. **Patient Wellness and Comfort.** Patient comfort and health is the primary concern for facility managers and workers. Patients in hospitals and other health and wellness facilities often refer to their room's temperature when asked about their comfort. A too-hot or too-cold room might sour a patient's experience, or even be detrimental to their health. Meanwhile, there is no one-size-fits-all approach; one patient may require the soothing comfort of heat, while a patient in

the very next room may require the refreshing briskness of cold. Hospitals can respond to these varying needs with HVAC systems that allow patients to set their own temperature, and their own comfort.

Humidity plays into patient comfort as well, and can also be a factor in patient health. Overly humid conditions can cause fatigue, detracting from patients' comfort, and can work against a facility's attempts to control microbial growth. The Mitsubishi Electric VRF zoning system is not a dehumidifier, but the dry mode can contribute to the dehumidification of the building by removing moisture from the air.

2. **Quiet Operation.** Temperature regulation must happen quietly, as patients want to feel relaxed and unaware of a blowing fan. Mitsubishi Electric's VRF systems are rated between 19 and 34 decibels. A whisper comes in at 35 decibels. So these systems are truly quieter than a whisper.

   Shawn Brill, a founding partner of Bighorn Consulting Engineers, Inc., Grand Junction, Colorado, said that VRF zoning systems' "lack of noise" is very real, and is especially important to health and wellness facilities. "Even the outdoor units are quiet," he said. "I drove up to [a facility to] do a final inspection once and couldn't even hear the unit running. I didn't know it was running until I put my hand on it." Such quiet operation helps ensure a pleasant and undistracted experience for patients, staff and visitors.

3. **Individual Zone Control.** Zone control goes beyond one patient wanting heat while another wants cooling; zone control ultimately allows separate departments within the facility to have separate climates. This is important in a facility that must offer patients – in various states of undress – a warm environment, but must keep laboratories and operating rooms at a cooler temperature for health reasons.

   Many of Mitsubishi Electric's VRF systems connect up to 50 indoor units – meaning 50 separate zones – to a single outdoor unit.

4. **Energy Efficiency.** Health and wellness facilities are not just in the business of making everyone comfortable, they are also in the business of making money. They want HVAC systems that save money, and a great way to save money is by using energy more efficiently.

   Mitsubishi Electric VRF zoning systems' energy efficiency largely comes from their proprietary INVERTER-driven compressors. The system performs at the minimum energy levels necessary and does not waste electricity when partial-load conditions are present.

   Significant energy savings also result from pushing refrigerant through 1-inch pipes versus pushing huge volumes of conditioned air through costly, expensive-to-install ductwork.

5. **Ease of Maintenance.** In traditional ducted systems, servicing a unit in the system means taking down the entire unit. In the case of a health and wellness facility, this could mean the entire facility – the entire clinic, the entire hospice, the entire hospital, etc. – going without cooling and heating. This is potentially a very dangerous situation, wherein patients' health is put at risk, and likewise the work and research taking place in laboratories (e.g., the testing of fluids) is compromised.

   VRF systems offer an answer to this monumental challenge; with VRF zoning, individual units can be serviced while *every other unit* remains online. This means residents, employees and visitors remain comfortable, all while sensitive materials remain the temperature they need to be.

Click here for more information about Mitsubishi Electric's VRF zoning systems.

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Why VRF Zoning Systems Benefit Health and Wellness Design Teams

Architects are challenged with satisfying the design needs of entire project teams – engineers, facility managers, owners, builders, developers and more. Working with HVAC systems may not be as exciting as selecting interior finishes, but it's important to choose a system on which everyone agrees. Variable Refrigerant Flow (VRF) zoning systems from Mitsubishi Electric US, Inc. Cooling & Heating Division (Mitsubishi Electric) offer a compelling solution, especially for health and wellness facilities. Here are a few users giving reasons they chose VRF zoning systems:

VRF technology provides personalized, zoned comfort in each room of the Rush Foundation Hospital while saving considerable energy costs.

- "These options helped me build a truly unique whole-building solution that fits the function and comfort needs of each station in the hospital." – Fred Rogers, vice president, chief resource officer and facility manager, Rush Health Systems, Meridian, Mississippi
- "This was easy to install in an historic home and provided simultaneous cooling and heating from one bedroom to the next." – Dave Hamilton, field service, EMCOR Service/Tucker Mechanical, Meriden, Connecticut
- "They are extremely quiet – as low as 24 dB(A) – a factor that is especially important in health care facilities." – George Skinner, sales manager, HVAC contractor and distributor, GSC Limited, Hamilton, Bermuda
- "The outdoor compressor units have the smallest footprint in the industry – and with the two-pipe system there is no wasted space." – Stan Williamson, senior project manager, McLain Plumbing & Electrical Services, Inc., Philadelphia, Mississippi

VRF zoning systems ensure patients' comfort and health.

To read more about the pairing of VRF zoning systems with health and wellness facilities, click here.

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How Designers of Health and Wellness Facilities Are Impacted by LEED v4 Updates

LEED v4 focuses on sustainability and product transparency.

The U.S. Green Building Council (USGBC) recently unveiled LEED v4. Architects of health and wellness facilities will notice the two most significant changes to LEED v4 from LEED 2009 as it relates to HVAC systems are increased energy efficiency requirements and a new Integrative Process credit.

LEED v4 now requires all buildings to meet or exceed ASHRAE Standard 90.1-2010, which requires buildings to achieve an additional energy improvement of nearly 30percent over LEED 2009's requirement of meeting ASHRAE 90.1-2007. Cooling and heating systems are the single greatest energy source in commercial buildings, making them excellent areas in which to achieve energy improvement. Efficient HVAC solutions, like VRF zoning systems, meet ASHRAE 90.1-2010 and can help architects meet this new requirement.

LEED v4 also includes a new Integrative Process credit. The American Institute of Architects (AIA) has long supported integrated project delivery, but this is the first time it has been acknowledged by USGBC as a requirement. This credit encourages collaboration across project teams to conduct an early analysis of energy and water systems. Early analysis creates time for revision if project goals are not being met.

This will be a new challenge for architects working on aspects of a building (like HVAC) that were previously in the engineer's realm. But it also means that architects will have more control over these critical aspects that have long required design alterations to accommodate ductwork. Designing for the Integrative Process credit gives the opportunity to provide an efficient HVAC solution that won't require architects to compromise design.

Project teams may register for either LEED v4 or LEED 2009 project certification through the end of October 2016; after that time, only LEED v4 will remain open. Download the complete User Guide here for a comprehensive review of LEED v4.