

Wireless technologies bring comfort to buildings

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Positioning a new technology in a commercial market is never easy. Only technologies that are either significantly less expensive or provide considerably more value will penetrate existing markets that are resistant to change.

Wireless technologies have proven their value and convenience in many industries beyond telecommunications, but using wireless devices to control and monitor heating and air-conditioning systems is an area that has not been extensively explored. However, Pacific Northwest National Laboratory staff members are working with the Department of Energy Office of Energy Efficiency and Renewable Energy to break into this area, promoting the use and production of wireless technologies that are convenient, effective, and valuable.



Wireless temperature sensors and receivers can be used for temperature control in facilities where installing hard-wired sensors would be very costly. PNNL has successfully demonstrated the technology in Hanford's 337 Building.

PNNL's strategy is to use wireless devices for temperature control in existing commercial buildings, to prove they do work, and then recommend their use in future construction to make new buildings more energy-efficient.

"This really is an enabling technology," said senior research scientist Michael Kintner-Meyer. "While we didn't develop this technology, we did find a way to modify an existing technology to work with our needs. The results prove that it can and does work."

With wireless technology, repositioning thermostats and sensors or installing additional sensors couldn't be easier. "With hard-wired systems, thermostats are fixed and may not be positioned to prevent 'trouble spots' in a building," said PNNL scientist Mike Brambley. "Wireless sensors can be located in places difficult to run wire, and can then enable more effective — and more efficient — control of the temperature in any area of a building."

The process is simple. Determine the problem areas of a building — places where it's either too hot or too cold — then purchase a sensor and place it on a desk or a wall. The sensors do the rest.

The value of wireless sensing has been proven in PNNL's 337 Building, where the steel-reinforced-concrete construction of the building is a barrier to easily adding additional temperature sensors. Using wireless sensors has proven to be a simple and effective way to maintain better control over user comfort and equipment operation.

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Best of all, the additional sensors provide the necessary data to save on the electricity bill. Using the additional indoor temperature information, the electrically driven chiller can be operated in an energy-efficient mode when less cooling is needed.

Dwight Hughes, building engineer for the 337 Building, has embraced the new wireless technology to reduce energy consumption while providing quality indoor work environments. When Hughes was contacted because of a heat build-up problem in the cafeteria's kitchen, he knew what to do. He taped a wireless temperature sensor at the trouble spot and monitored the temperature trend over a day. He quickly recognized that the original hard-wired temperature sensor for the zone was too far away from the trouble spot and didn't register the heat build-up. He reprogrammed the system — problem solved!

The DOE program also includes demonstration of wireless sensing for monitoring and diagnostics on package rooftop HVAC units. While current work focuses on assessment of the cost, performance and impacts of available technology, in this fiscal year the work will address changes in the technology to further reduce costs and enhance performance.

Other staff members who are contributing to the research are Teresa Carlon, Nathan Bauman, Dan Sisk, Ron Underhill and Wade Spence. For more information, contact Michael Kintner-Meyer at 375-4306 or Michael Brambley at 375-6875. ■