

Building America *Technical Highlight*



NREL Delivers In-Home HVAC Efficiency Testing Solutions

Researchers at the National Renewable Energy Laboratory (NREL) have recently developed two simple in-home efficiency test methods that can be used by technicians, researchers, or interested homeowners to verify the correct operation and energy efficiency of a home's air conditioning and heating equipment.

An efficiency validation method for mini-split heat pumps (MSHPs)—highly efficient refrigerant-based air conditioning and heating systems that permit room-by-room conditioning and control—will enable building researchers to easily explore the installed performance of this class of equipment. MSHPs are very popular overseas and are gaining market share in energy efficient home upgrades throughout the United States. Yet, because MSHPs have multiple variable-speed components that



Mini-split heat pump under test. Photo by Xia Fang, NREL/PIX 18336

work in tandem, their performance is challenging to measure in a real home. NREL researchers developed a field evaluation method including test equipment, methods, and data analysis to determine the installed performance of this equipment in occupied homes. A field test was conducted to validate the method.

When testing a home's operation, it is often important to simulate occupancy within an unoccupied home. That way, the researcher will know the actual usage profiles for heat and moisture generation; this removes the uncertainty associated with real occupants. The second test method details a standardized protocol for generating heat and moisture loads, to mimic occupants and their activities by using heaters and humidifiers. Realistic heat and moisture loads can be used to drive air conditioning systems, evaluate air distribution systems, and examine building enclosure technologies. These loads are drawn from the Building America House Simulation Protocols. Proper application of the method will result in better comparison between performance of the test home and its simulated analogue. This method is also validated by field testing.

These test methods are now available in two technical reports. The methods can be used widely by the building research community to confirm proper operation of space conditioning equipment in homes, thereby improving thermal comfort, building health, and durability.

Key Research Results

Achievement

NREL researchers developed two in-home efficiency test methods for validating the correct operation and energy efficiency of a home's air conditioning and heating equipment.

Result

Simplified and standardized test methods for residential equipment and homes will enable quicker and easier field verification of efficiency claims and program objectives.

Benefit

National objectives for cost-effective energy savings in the residential sector can be met more quickly and with greater consistency.

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For more information

Christensen, D.; Fang, X.; Tomerlin, J.; Winker, J.; and Hancock, E. (2011). Field Monitoring Protocol: Mini-Split Heat Pumps. DOE/GO-102011-3227. March 2011. www.nrel.gov/docs/fy11osti/49881.pdf

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Hendron, R.; Engebrecht, C. (2010) Building America House Simulation Protocols. DOE/GO-102010-3141. October 2010. www.nrel.gov/docs/fy11osti/49246.pdf

NREL Field Test Best Practices Resource: <http://buildingsfieldtest.nrel.gov/>