slipstream

Reimagining HVAC in New Manufactured Housing

Slipstream, partnering with the University of Central Florida–FSEC Energy Research Center and the Washington State University Energy Program, received nearly $1,000,000 from U.S. Department of Energy to reimagine HVAC in new manufactured housing (MH) over three years.

Our project team seeks to evaluate, refine, and field test new approaches for delivering space heating and cooling in manufactured homes to improve energy efficiency, durability, and indoor air quality without significantly increasing production and MH siting costs.

Project objectives

1. Implement a feasibility assessment of several duct-sealing and high-efficiency heat pump innovations and through stakeholder interviews and discussions to identify the most promising innovations based on market drivers and barriers, energy impacts and cost effectiveness.
2. Implement proof-of-concept testing and field trials on the most promising innovations to further demonstrate feasibility.
3. Provide detailed guidance to the MH industry for widespread adoption of HVAC-related innovation.

The project team is seeking input from manufactured home industry partners to support the effort and ensure it produces results that will help the industry tap potential savings and deliver a superior product to its customers. The innovations under consideration fall into two major categories: improving ductwork and incorporating high-efficiency heat pumps. While innovation around duct sealing seeks to address a shortcoming of current construction practices, innovation with heat pumps seeks to introduce an inherently more efficient technology into this housing segment.

Ductwork improvements: In manufactured homes, duct leaks generally represent a direct loss of conditioned air to the outside and thus a direct penalty on overall system efficiency. Obtaining consistently tight ducts that maintain their tightness over time—or eliminating the need for ductwork entirely—is key to improving the energy performance of MHs. (*See Figure 1.*)

RESEARCH PARTNERS

UCF | FSEC Energy Research Center
UNIVERSITY OF CENTRAL FLORIDA

WASHINGTON STATE UNIVERSITY

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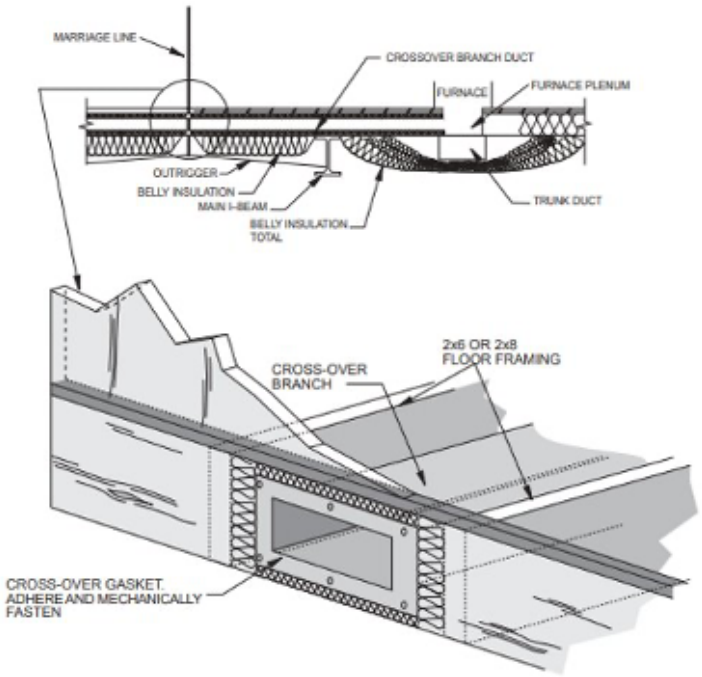

Figure 1: Example improved through-the-rim crossover-duct design.
Source: 2004 Northwest Energy Efficiency Manufactured Home Program In-Plant Inspection Manual

Figure 2: Example heat pump installed on a manufactured home. Photo courtesy of Brady Peeks, Northwest Energy Works

High-efficiency heat pumps: Modern inverter-driven air source heat pumps are not only significantly more efficient than older heat pump technology—and vastly more so than the electric-resistance heating that ships with many MHs—they are also capable of operating under much colder conditions than previous generations of heat pumps. (*See Figure 2.*)

Partners

Slipstream: Nonprofit with experienced researchers and field testers with more than 40 years performing MH retrofits and training.

University of Central Florida–FSEC Energy Research Center: Four decades of application-oriented energy efficiency and renewable energy buildings research. Conducted pioneering work for high performance manufactured homes.

Washington State University Energy Program: More than 30 years working to improve the efficiency, durability, and indoor air quality of new manufactured homes.

Want to learn more?

If you would like more information about the study please contact Slipstream:

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Project Team Research Examples

- Minnesota manufactured home market characterization
- Field investigation and construction modifications to prevent persistent HVAC-related failures, 5 manufacturers
- Monitored field and laboratory studies in manufactured homes: ventilation, energy use and savings, crawl space, ducts
- Retrofit of Blown Attic Insulation in Existing HUD-Code Manufactured Homes: Needs Assessment Report, U.S. DOE Building America Office of EERE
- Manufactured Home Performance Case Study: A Preliminary Comparison of Zero Energy and Energy Star

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