

# Cold climate ductless heat pump

## DESCRIPTION

Ductless heat pumps are electrically-powered HVAC products that provide both space heating and cooling by extracting heat in air from one location and transferring it to another. These systems use a vapor compression cycle to move heat from indoors to outdoors in the cooling season and from outdoors to indoors during the heating season. During the heating season, refrigerant is compressed in the outdoor unit and is sent indoors as hot gas. As the refrigerant condenses, it releases heat and is ultimately piped back outdoors to repeat the process. The reverse of this process is used during the cooling season.

For cold climate applications, ductless heat pumps must adequately provide heating in sub-freezing conditions. Cold climate systems are inverter-driven and can run at variable speeds allowing them to work efficiently in very low temperatures, as low as -25 °F, without supplemental heat.

## DEMONSTRATING THE TECHNOLOGY

Cold climate ductless heat pumps are suitable for new construction and retrofit of single-family homes and multifamily buildings. They might also be suitable for some small commercial building applications; buildings that have medium to low internal heat gains, regular occupancy, and wintertime heating load.

Testing and demonstration sites could be recruited through programs targeting HVAC equipment replacement or new construction programs.



(above) Photo credit: Zia Fang, <http://images.nrel.gov/viewphoto.php?imageId=6309977>

(inset) Photo credit: Seventhwave

CRITERIA	VALUE
Electricity savings	2.47 kWh/ft <sup>2</sup>
Cost savings	\$0.32/ft <sup>2</sup>
Measure life	18 years
2017 simple payback	15 years
Carbon emissions avoided	1.7E-03 MT equivalent CO <sub>2</sub>
How it saves energy	Uses less energy than conventional heat pumps with electric resistance heat; can be zoned to manage heating and cooling only when the space is occupied; no energy loss through ducts.
Non-energy benefits	Ductless so can be installed in homes with hydronic or radiant heat; provides both heating and cooling.
Barriers to adoption	Cost

## FOR MORE INFORMATION

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