



Are You in the Market for a Heat Pump?

Today's heat pumps offer reliable performance, economic benefits, and climate/health benefits.

Technological advances over the past 10 years allow heat pumps to perform in cold, sub-freezing temperatures. "Leading products are now capable of performing well below -10°F and operating at more than double the efficiency of resistance or gas systems below zero. These aren't just manufacturer claims: heat pumps have been successfully field tested in Minnesota (which has some of the coldest winters in the Continental United States) and as far north as the Arctic Circle!"¹ Six major manufacturers accepted Department of Energy's CCHP Technology Challenge to optimize residential electric only heat pumps for two consumer sets: 5°F (-15°C) operation and the other for -15°F (-26°C) operation.² Efficiency requirements for residential central air conditioning and heat pumps will rise in 2023.³ The timeline for the CCHP Technology Challenge calls for completion of field testing and initiation of commercialization by 2024.

Heat pumps provide heat in winter and cooling in winter. The costs to install a new heat pump range from \$3,000 to \$30,000 depending on the type of heat pump, the efficiency of the heat pump, and whether the home has existing ductwork. This is roughly equivalent to installing a new gas furnace with central air conditioning. In terms of operating costs, Based on "Average Consumer Expenditures for Heating Fuels in the 2017-2018 Winter in the Northeast U.S", modern air- and ground-sourced electric heat pumps have similar operating costs (\$703) to natural gas (\$742) furnaces and are approximately twice as efficient as electric baseboard heating (\$1,406), oil (\$1,376) and propane (\$1,856).⁴ Since then, the price of natural gas has increased and the performance of heat pumps has improved, making electric-powered heat pumps more cost-effective.

Heat pumps can improve air quality in your home by eliminating air pollutants and minimizing allergens. There are also benefits to the climate as we all switch fuels to electricity. As the grid overall uses more and more clean energy, your carbon footprint shrinks.

¹ RMI :Heat Pumps: A Practical Solution for Cold Climates December 10, 2020 By Michael Gartman Amar Shah <https://rmi.org/heat-pumps-a-practical-solution-for-cold-climates/>

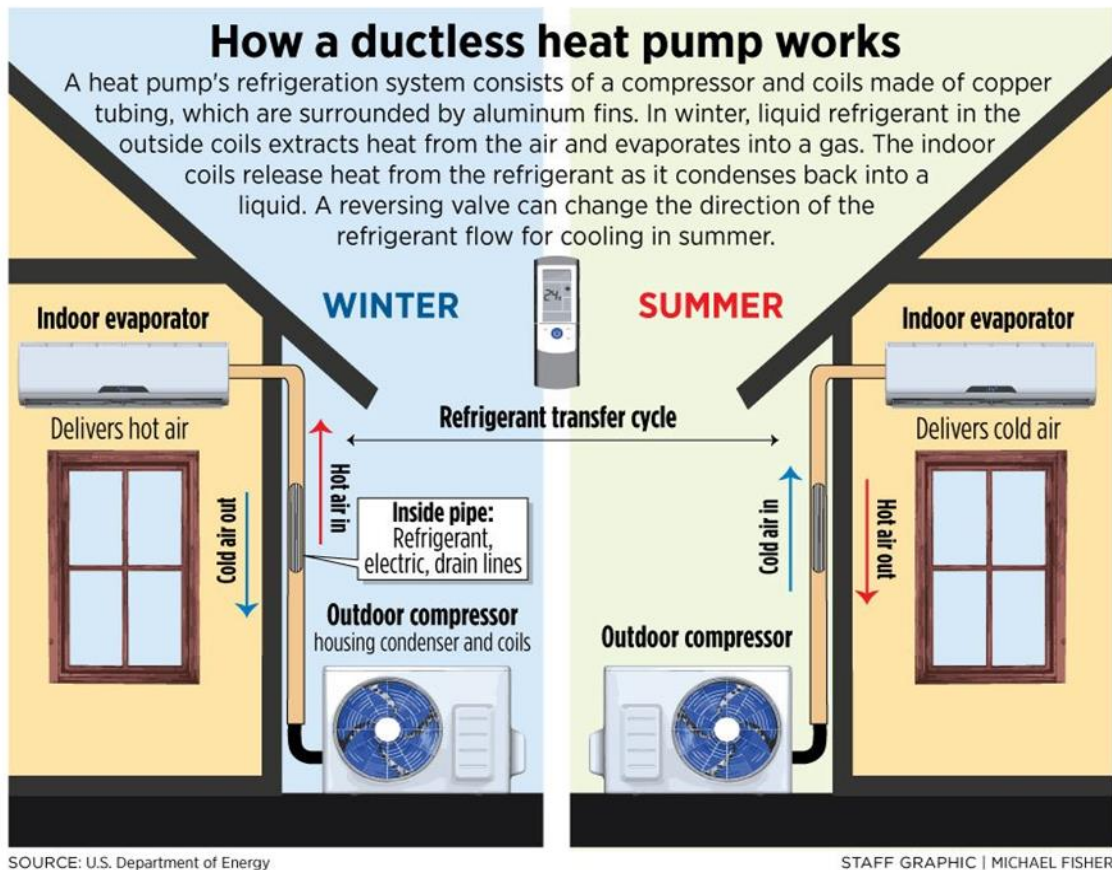
² DOE Residential Cold Climate Heat Pump Technology Challenge, October 2021 <https://www.energy.gov/sites/default/files/2021-10/DOE%20CCHP%20Tech%20Challenge%20Fact%20Sheet%2010-28-2021%20v2.pdf>

³ Efficiency requirements for residential central AC and heat pumps to rise in 2023, July 30, 2019. <https://www.eia.gov/todayinenergy/detail.php?id=40232>

⁴ NJ 2019 Energy Master Plan, p. 158 https://nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf

If you are planning on building a new home, replacing your inefficient furnace or air conditioner, or just want to supplement your existing heat system; then now is the time to consider an electric heat pump or ground source/geothermal system.

To help you prepare, the NJ Chapter of the Sierra Club has informative webinars as well as a primer on heat pumps to introduce you to heat pump operation and benefits. If you have any questions, contact Steve Miller, Chapter Building Electrification Issue Coordinator. stevemiller@comcast.net



LINKS FOR GUIDES

[NYSERDA Heat Pump Planner](#) Informative pamphlet discussing use of heat pumps in one story homes, two story homes, mobile homes, apartments, and townhomes.

[Northeast Energy Efficiency Partnerships \(NEEP\) Heat Pump Buying Guide](#)

[Energy Star Heating and Cooling Guide](#)

[Minnesota Air Source Heat Pump Collaborative](#) Minnesota winters are terrible. The Residential and Commercial pages include interesting case studies.

[NJ Residential Energy Rebates](#)

[NYSERDA Heat Pumps](#) Compares the benefits of air source vs. ground source heat pumps

[NEEP's Cold Climate Air Source Heat Pump List](#) Heat pumps are listed with BTU generated at 5^o Fahrenheit, in addition to cooling capacity.

Heat Pump Glossary of Terms

COEFFICIENT OF PERFORMANCE (COP), COOLING is the ratio of the rate of net heat removal to the rate of total energy input, calculated under designated operating conditions and expressed in consistent units, as determined using the applicable test method in the Appliance Efficiency Regulations or Section 110.2.

COEFFICIENT OF PERFORMANCE (COP), HEATING is the ratio of the rate of net heat output to the rate of total energy input, calculated under designated operating conditions and expressed in consistent units, as determined using the applicable test method in the Appliance Efficiency Regulations or Section 110.2.

COEFFICIENT OF PERFORMANCE (COP), HEAT PUMP is the ratio of the rate of useful heat output delivered by the complete heat pump unit (exclusive of supplementary heating) to the corresponding rate of energy input, in consistent units and as determined using the applicable test method in Appliance Efficiency Regulations or Section 110.2.

DUAL-FUEL HEAT PUMP is an electric heat pump with gas furnace supplemental heat that alternates between the two fuel sources.

DUCTED SYSTEM is an air conditioner or heat pump, either a split system or single-packaged unit, that is designed to be permanently installed equipment and delivers conditioned air to an indoor space through a duct.

HEAT PUMP is an appliance, that consists of one or more assemblies; that uses an indoor conditioning coil, a compressor, and a refrigerant-to-outdoor air heat exchanger to provide air heating; and that may also provide air cooling, dehumidifying, humidifying, circulating, or air cleaning.

HEAT PUMP WATER HEATER (HPWH) is a water heater that transfers thermal energy from one temperature level to a higher temperature level for the purpose of heating water, including all ancillary equipment such as fans, storage tanks, pumps, or controls necessary for the device to perform its function.

SINGLE-PASS HEAT PUMP WATER HEATER is a HPWH for which the cold water passes through the heat pump(s) once and is heated to the intended storage temperature.

MULTI-PASS HEAT PUMP WATER HEATER is a HPWH for which the cold water passes through the heat pump(s) multiple times, each time gaining a temperature increase, until the tank reaches the intended storage temperature.

HEATING SEASONAL PERFORMANCE FACTOR (HSPF) is the total heating output of a central air-conditioning heat pump (in Btu) during its normal use period for heating, divided by the total electrical energy input (in watt-hours) during the same period, as determined using the applicable test method in the Appliance Efficiency Regulations.

HEATING SEASONAL PERFORMANCE FACTOR 2 (HSPF2) is the HSPF metric for residential central heat pumps effective January 1, 2023, as created by the U.S. Department of Energy “[ISSUANCE 2017-01-05 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps, Final Rule](#)”.

MINISPLIT AIR CONDITIONERS AND HEAT PUMPS are air conditioner or heat pump systems that have a single outdoor section and one or more indoor sections. The indoor sections cycle on and off in unison in response to a single indoor thermostat.

MULTIPLE-SPLIT AIR CONDITIONERS AND HEAT PUMPS are air conditioner or heat pump systems that have two or more indoor sections. The indoor sections operate independently and can be used to condition multiple zones in response to multiple indoor thermostats

NEEA is the Northwest Energy Efficiency Alliance.

NEEA ADVANCED WATER HEATER SPECIFICATION is NEEA specification for heat pump water heaters. As of May 1, 2022, version 8.0 was available [here](#).

NONDUCTED SYSTEM is an air conditioner or heat pump that is permanently installed; directly heats or cools air within the conditioned space; and uses one or more indoor coils that are mounted on walls or ceilings within the conditioned space. The system may be of a modular design that allows for combining multiple outdoor coils and compressors to create one unified system.

SEASONAL ENERGY EFFICIENCY RATIO (SEER) is the total cooling output of an air conditioner in Btu during its normal usage period for cooling, divided by the total electrical energy input in watt-hours during the same period, as determined using the applicable test method in the Appliance Efficiency Regulations.

SEASONAL ENERGY EFFICIENCY RATIO 2 (SEER2) is the SEER metric for residential central air conditioners and heat pumps effective January 1, 2023, as created by the U.S. Department of Energy “[ISSUANCE 2017-01-05](#)” referred to above.

SINGLE PACKAGE VERTICAL HEAT PUMP (SPVHP) is a single package vertical air conditioner (SPVAC) that utilizes reverse cycle refrigeration as its primary heat source, with secondary supplemental heating by means of electrical resistance, steam, hot water, or gas.

SINGLE ZONE SYSTEM is an air distribution system that supplies air to one thermal zone controlled by a single thermostat.

SPACE-CONDITIONING SYSTEM is a system that provides mechanical heating or cooling within or associated with conditioned spaces in a building. It may incorporate components such as chillers/compressors, fluid distribution systems (e.g., air ducts, water piping, refrigerant piping), pumps, air handlers, cooling and heating coils, air- or water-cooled condensers, economizers, terminal units, and associated controls.