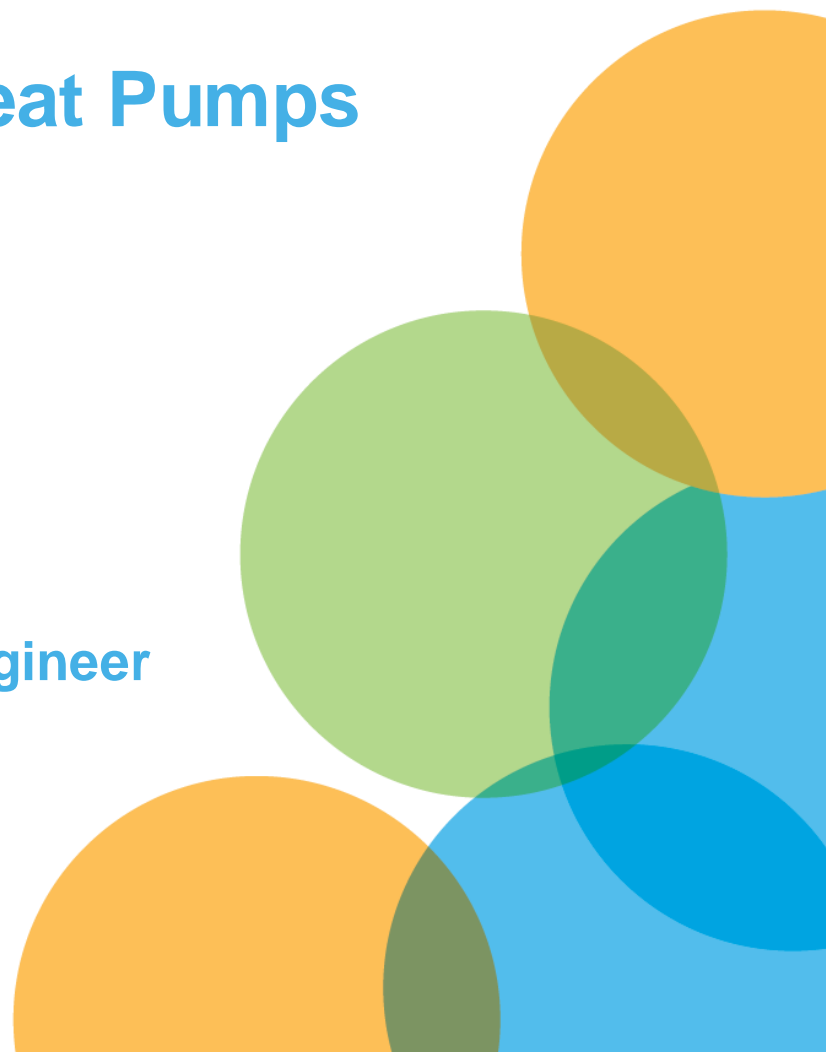


Cold-Climate Air-Source Heat Pumps

November 2018

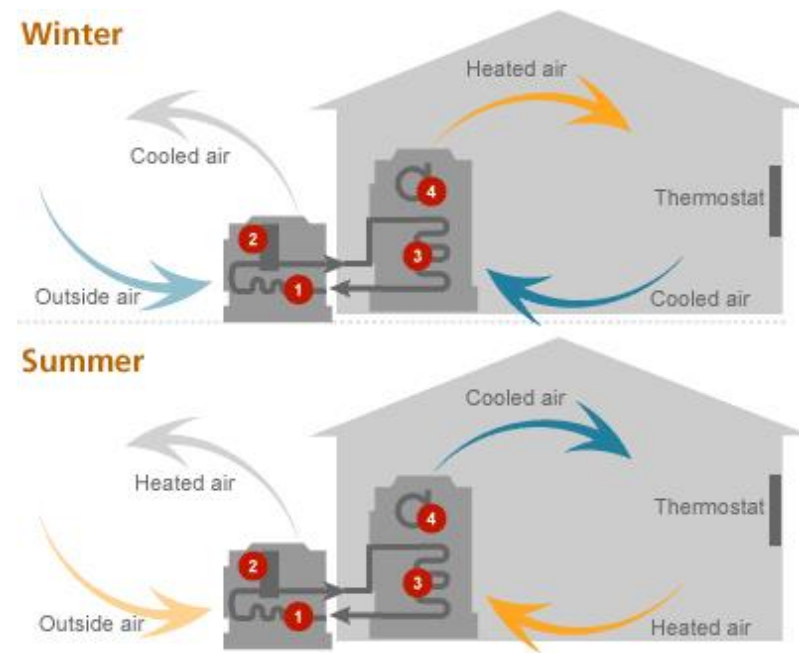
Ben Schoenbauer, Senior Research Engineer

Center for Energy and Environment



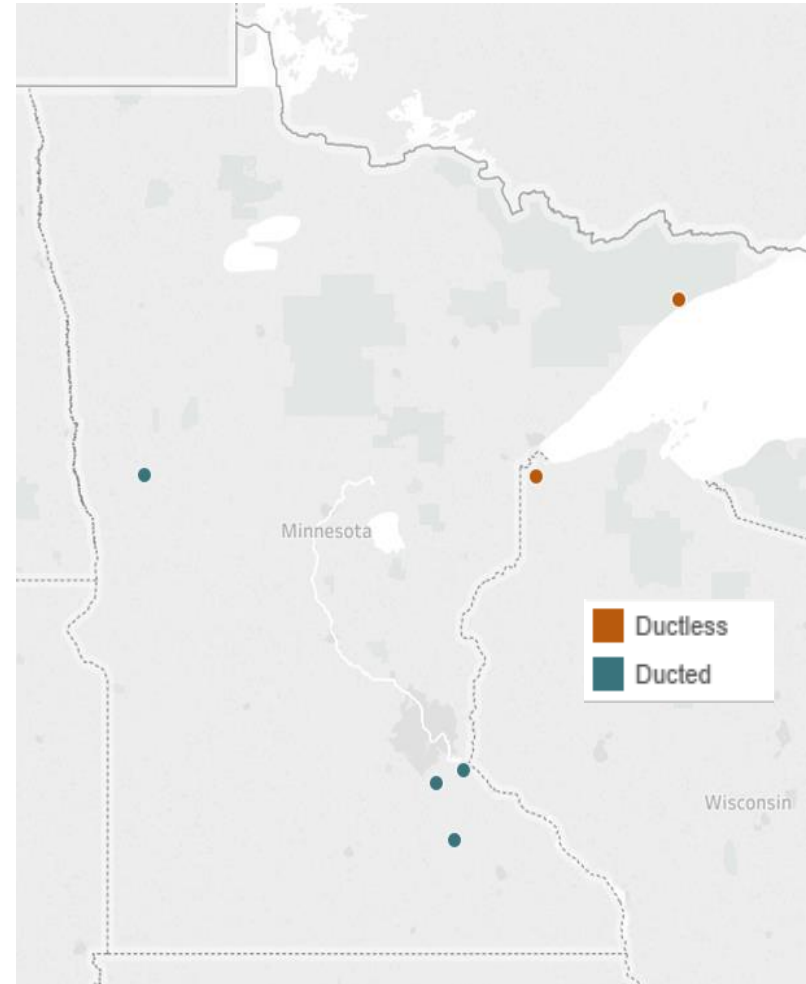
• Cold Climate Air-Source Heat Pump?

- An ASHP uses a refrigerant system involving a compressor, condenser, and evaporator to absorb heat at one place and release it at another.
- New generation systems can operate as low as -13°F
- ASHPs have the potential to deliver energy and peak saving as well as reduce reliance on delivered fuels.



Study Overview

- Field Study
 - 8 ccASHP in a variety of MN residences
 - Monitor installed field performance of ASHP & backup
- Install was very important
 - Equipment
 - Sizing
 - Operation
 - Integration with back-up systems



ccASHP System Types

Ducted Flex Fuel



Ducted All Electric



Ductless Mini-Split



Annual Characteristics and Savings

- Ducted ccASHP compared to condensing furnace (LP)
 - Annual COP improved to 1.3 (over 0.85)
 - ~40% site energy reduction
 - ~30% cost reduction
 - ~60% reduction in propane use
 - ~5% reduction in emissions
- Ductless ASHP compared to ER
 - Annual COPs improved to 2.1 (over 1.0 for ER)
 - ~55% reduction in site energy, cost, and emissions
- All Electric Ducted systems
 - Annual COP ~1.9
 - ~48% reduction in site energy, cost, and emissions

www.mncee.org/heat_pumps



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Keep Reading ⋮

- Research Overview
- Research Projects 
- Participation Opportunities
- Field Notes Newsletters



Practical energy solutions for homes, businesses, and communities





THANK
you!

Alex Haynor

ahaynor@mncee.org

Ben Schoenbauer:

bschoenbauer@mncee.org

