ComEd
Energy Efficiency Program

GUIDE

AIR SOURCE HEAT PUMPS: A VIABLE ENERGY-SAVING OPTION FOR PROPANE HEATED HOMES

Thanks to advancements in technology, modern air source heat pumps (ASHPs) can effectively heat Midwestern homes, even in extreme cold. They are highly efficient, producing three to four units of heat for every unit of electricity consumed, and can provide significant cost savings compared to homes heated with propane alone. Adding an ASHP as part of a home's HVAC system can also reduce costs associated with propane tank fill-ups and more efficiently provide cooling for homes in place of a traditional air conditioner to contribute to additional cost savings.

This guide helps demonstrate and quantify the impacts of integrating ASHPs into propane-heated homes for the most common home types in northern Illinois: a 1950s-built home and an early 2000s-built home.

OPERATIONAL COST IMPACTS

Review the scenarios on reverse to better understand the potential cost and energy-use impacts a homeowner might see if they upgraded to an ASHP. In these scenarios we've compared the costs of heating and cooling two different kinds of homes, one built in the 1950s and one built in the early 2000s. The baseline HVAC system for both scenarios uses a propane furnace without a high efficiency fan motor and an inefficient air conditioner. That baseline system is compared to two different ASHP system types.

We found that for both home types, the homeowner is saving money on heating and cooling costs when an ASHP is integrated. No matter which kind of home you have it is important to note that right-sizing an ASHP is critical. Oversizing can lead to improper dehumidification and ineffective cooling during the summer and higher upfront costs. In some cases, it may make sense to install an ASHP to meet cooling needs only. However, most energy and cost savings from ASHP installations come from home heating, not cooling.

SOME DEFINITIONS

Two-Stage Heat Pump (HP): Any ASHP with two distinct stages of heating and cooling operation

Average Variable Speed Heat Pump (Avg VSHP): Any ASHP with an inverter-driven compressor, capable of many different stages of heating and cooling

Switchover Temperature: The temperature at which the heating system switches from using the ASHP to using the backup propane heating system

Energy Rates:

» The standard electric rate is $0.1321/kWh

» The propane rate used is $2.249/gal

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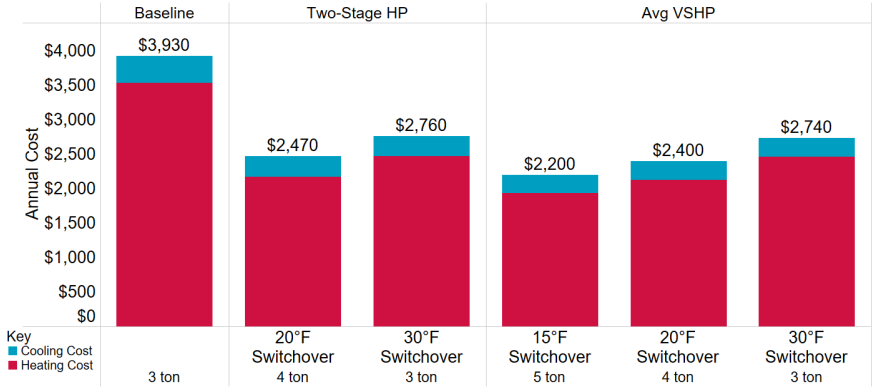
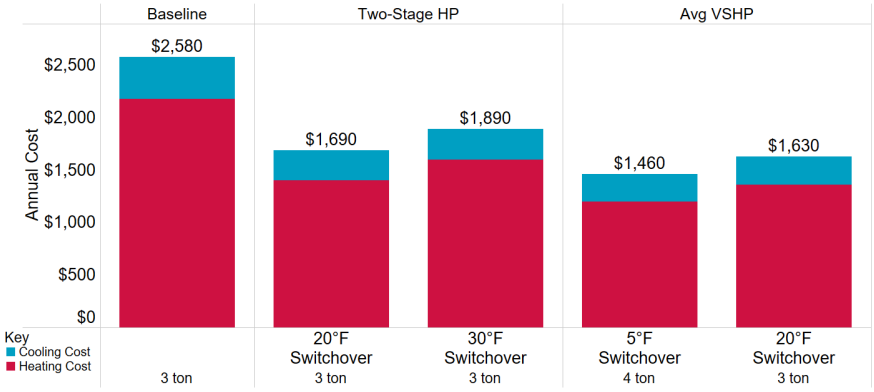
SCENARIO 1 – HOME BUILT IN THE 1950S

The home considered here is one built in the 1950s, which means it costs the homeowner more to heat and cool. For this homeowner, installing an ASHP could save $1,100 or more a year, depending on the system size and type.



SCENARIO 2 – HOME BUILT IN THE EARLY 2000S

In this scenario, the home built in the early 2000s is assumed to have improved construction from an older home, which means lower heating and cooling costs. In this scenario, the homeowner can save $700 or more annually by installing an ASHP, depending on the system size and type.



MODEL ASSUMPTIONS:

The potential savings values listed here are estimates, which are generalized results from field research, and are intended to provide relative performance information, rank options and make high-level decisions. These estimates should only be used when comparing scenarios for planning purposes. Both scenarios were modeled using data from a typical meteorological year for Chicago O'Hare Airport, and the typical heating load of either a 1950s-style home (scenario 1) or a 2000s-style home (scenario 2) in Chicago. Propane rates are based off the EIA 12-month average cost of residential propane from March 2021 to March 2022. System performance was based on a field performance-adjusted 80% AFUE non-condensing propane furnace and 10 SEER single-stage AC, two-stage air source heat pump (ASHP) archetype (15.5 SEER, 9 HSPF), and average cold-climate ASHP system archetype (16 SEER, 9.5 HSPF, 2.15 COP @ 5°F) developed for the modeling tool.

UNDERSTANDING THE RETURN ON INVESTMENT

After a ComEd Energy Efficiency Service Provider provides a cost estimate or quote for an ASHP purchase and installation, a return-on-investment (ROI) analysis can be performed. Here is one way to perform an ROI calculation:

1. Choose the baseline annual cost (from scenario 1 or 2) that best matches the amount spent on heating and cooling last year.
2. Looking at the same scenario selected in step 1, choose the ASHP type and size the Service Provider recommends. The annual cost indicated for that system is the cost the homeowner can expect if they upgraded to an ASHP.
3. Complete the calculation:

   Baseline annual cost
   – New annual heat pump cost
   Approximate yearly savings

   New equipment and installation cost
   ÷ Approximate yearly savings
   Number of years to payback

Example:

	Equipment cost	– Rebates/tax credits	
÷	Baseline annual cost	– New annual cost	
	NaN		
	Payback in years		

4. Consider other cost impacts. The HVAC Service Provider may be able to provide expected post-installation annual propane demand estimates. Using those estimates, the homeowner's propane supplier can help determine whether there will be rate or rental fee changes.

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