ComEd
Energy Efficiency Program

GUIDE

AIR SOURCE HEAT PUMPS: A VIABLE ENERGY-SAVING OPTION FOR NATURAL GAS 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 may be able to provide cost savings compared to homes heated with natural gas alone. ASHPs can also more efficiently provide cooling for homes in place of a traditional air conditioner and contribute to additional cost savings.

This guide helps demonstrate and quantify the impacts of integrating ASHPs into natural gas-heated homes using 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 the 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 natural gas 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 saves money on heating and cooling costs when an ASHP is integrated. It is critical to right-size an ASHP regardless of home type. 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: 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 natural gas heating system

Energy Rates:

- The standard electric rate is $0.1321/kWh
- The natural gas rate used for the baseline scenario is $0.95/therm
- The natural gas rate used for the heat pump scenario is $0.92/therm. Peoples Gas and North Shore Gas charge residential customers a lower rate when gas is not the principal heating source, which lowers the four-utility natural gas average.

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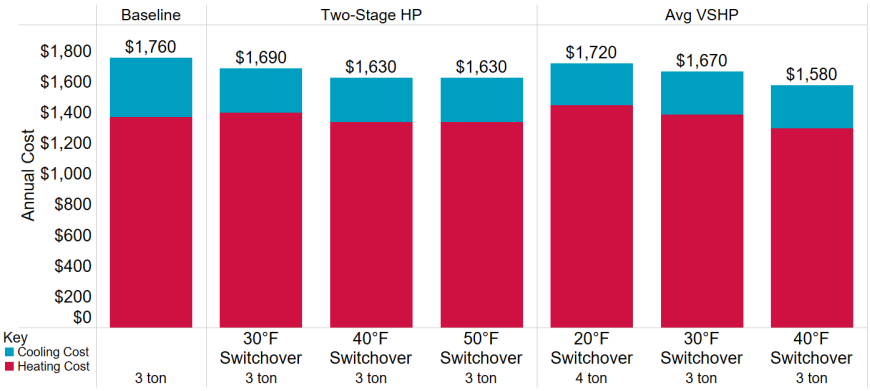
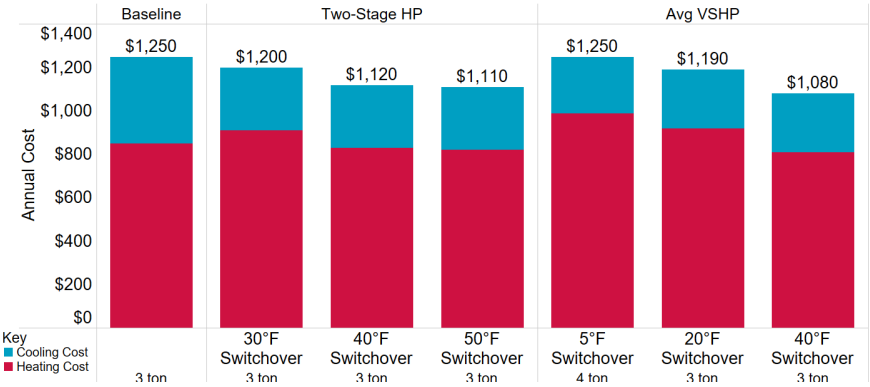
SCENARIO 1 – HOME BUILT IN THE 1950S

The home considered here is one built in the 1950s, which means it costs the homeowner more to heat and cool.



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 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. Listed gas rate is an average of Peoples Gas, Nicor, Ameren, and North Shore utility gas rates as of March 2022. Baseline scenario assumes a $0.95/therm gas rate, the average (as of March 2022) of Peoples Gas, Nicor, Ameren, and North Shore utility gas rates for customers with natural gas as their principal heating source. System performance was based on a field performance-adjusted 80% AFUE non-condensing natural gas 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 heat pump annual 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. Depending on the homeowner's natural gas provider they may be eligible for reduced fixed and per therm charges if the ASHP meets more than 50% of their annual heating needs. That could be a savings of $205* per year in reduced natural gas customer charges.

* Natural gas customer charge savings based on Peoples Gas' customer charge of $34.12 per month for space heating vs $17.07 per month for non-heating sales.

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