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The Evolution of Heat Pumps

Improved technology delivers year-round home comfort and energy efficiency

Homeowner demand for heat pumps has reached an all-time high and is expected to continue growing as technology evolves to bring year-round effective temperature control to even the coldest climates in North America. In fact, the heat pump market was almost an **estimated $82 billion** in 2022 and projected to reach $167 billion by 2030[i].

Dealers may already be witnessing this surge in homeowner interest firsthand as eco-conscious consumers are becoming increasingly interested in heating and cooling alternatives that reduce their carbon footprint. While heat pumps have been around since the 1950s, **the technology has advanced over time to become a viable option for virtually all regions of the country.**

Over time, energy efficiency has become a growing area of importance for homeowners – making efficient products, such as heat pumps and dual-fuel systems, an ideal solution. In 2022, homeowners were willing to spend on average about 60% more to increase their energy efficiency by 25%[ii]. This shift is ultimately driven by a desire to decrease heating and cooling bills.

Last year, 67% of homeowners reported that they conducted research prior to making a HVAC purchase[ii], ultimately helping them determine who to work with and what product features to prioritize. Consumers have become more knowledgeable about various government incentives, such as the **25C tax credit** in the U.S. and the Canada Greener Homes Initiative. As these incentives amplify the visibility of heat pumps, dealers have an opportunity to leverage this interest and use online resources to ultimately drive sales.

And while dealers understand how the products work, it's becoming equally essential to learn how they're evolving to bring homeowners the best possible solutions. **The following information can help dealers educate homeowners about heat pumps, the benefits of this technology, which specific systems or configurations would best suit their needs and what state incentives might be available to further support them in investing in a heat pump.**

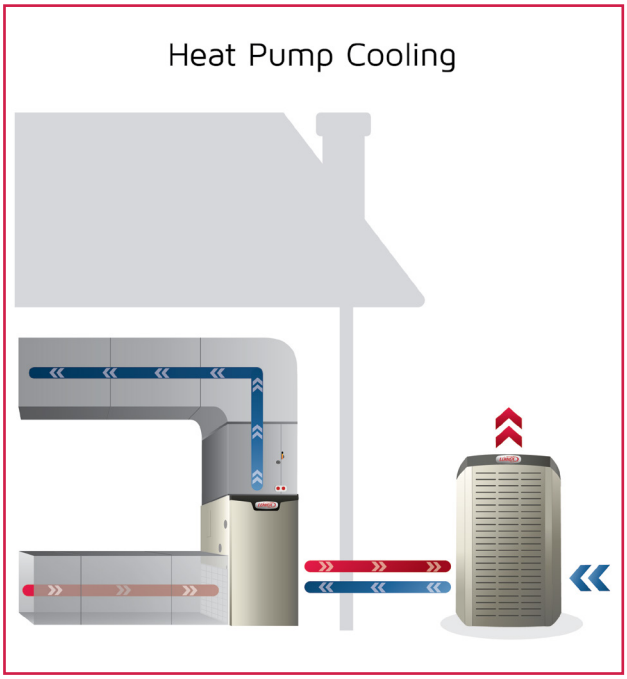
Does location matter?

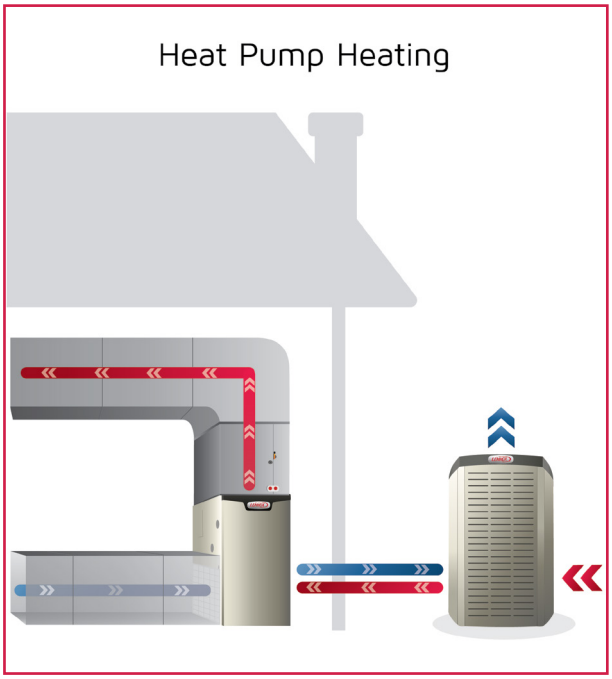
There's a clear correlation between awareness of heat pump technology and geography. As one might expect, an area's climate and temperature are key influences in a homeowner's decision to choose a heat pump. **In 2022, adoption of heat pump technology was most prevalent in the Southern region, specifically in states along the Gulf and Atlantic Coast, with 2% and 3% growth respectively.** Markets with the least amount of growth were New England and Midwestern states bordering the Great Lakes, which means there's tremendous opportunity to educate homeowners in those regions on the technology's many benefits.

Source: Lennox Market Share Insights by Leidos

Heat Pump 101 for Homeowners

While most dealers know how a heat pump or dual-fuel system works, it may be harder to explain this technology to a homeowner. Below are talking points that dealers can utilize to easily convey how the system operates:





- A heat pump works similarly to an air conditioner. However, a key difference is that while an air conditioner primarily runs during the warmer seasons and only comes with cooling capabilities, a heat pump can run year-round to provide both heating and cooling comfort.
- Every heat pump system needs an indoor component to move the air through the home. In more temperate climates, an air handler is typically used. In colder climates, a gas furnace can be paired with the heat pump to create a dual-fuel system.
- During warmer months, a heat pump extracts heat from inside the home and transfers it outside to cool the home. In cooler months, the process is reversed, and the heat pump transfers heat from outside into the home.
- Switching from heating to cooling is made possible by a reversing valve that switches the flow of refrigerant back and forth based on the desired function.
- Of course, there are times when there's just not enough heat to pull in from the outside. In those instances, supplemental electric heat strips within the air handler kick in to warm the air to a comfortable temperature.
- Another alternative for extreme cold climates is a dual-fuel heat pump, which deploys heat from a gas furnace when it gets too cold. During warmer months, the dual-fuel system still incorporates the furnace but without using any burners. Just its air distribution features to circulate cool air throughout the home.

Not Your Parents' Heat Pump

When discussing heat pumps with homeowners, especially in cooler climates, they may come with some pre-existing myths, beliefs and opinions that will surely lead to questions about the technology, such as:

- *Will it keep me as warm in the winter as my furnace?*
- *How does the defrost cycle work?*
- *Why does it cost more than other options?*
- *How often is the supplemental electric heat used on the air handler?*
- *Is it really as reliable as a gas furnace?*
- *Is it proven to be more efficient than other options?*

Such questions are understandable and can be answered with confidence by a knowledgeable and well-informed dealer. Heat pumps have been around for decades, and the technology has steadily improved over time. While it may be true that early heat pumps weren't capable of consistently and comfortably heating homes in climates with average temperatures between 10-30 F in the middle of winter, that's no longer the case. **Heat pumps today, such as Lennox' SL25XPV heat pump, can effectively extract heat from outside air and warm homes in temperatures below 10 F and can continue to provide heat below 5 F with supplemental electric heat – and they're still improving.** Today's cold climate heat pumps are less reliant on supplemental heat from electric heat strips or gas furnaces and can keep homes warm in freezing temperatures. With the Cold Climate Heat Pump Technology Challenge, and the focus on further heat pump improvements, the heat pumps of tomorrow will be even more efficient and effective in colder climates and be able to maintain performance with supplemental heat well into negative temperatures.

Taking on the Challenge

In 2022, Lennox was the first HVAC OEM to complete the U.S. Department of Energy's Cold Climate Heat Pump Technology Challenge – an effort to develop more affordable and efficient heat pumps in any climate. The DOE is currently partnering with Lennox and other heat pump manufacturers to test the technology and demonstrate its real-time performance. Right now, Lennox is monitoring the performance of cold climate heat pumps installed in residential homes in the U.S. and Canada. The Challenge – which kicked off ahead of winter 2022 - will run through the 2023 winter season. So far, Lennox heat pumps have operated optimally in each location.

Conveying the Energy Efficiency Benefits

When it comes to energy efficiency, maintaining comfort in the home cannot be sacrificed. **Ninety percent of homeowners agree that energy efficiency means that they can feel as comfortable as possible at a price level they can afford**[ii]**.** While previous heat pump

technology may not have been able to meet this combined expectation, new products, such as the **SL25XPV** and **EL22XPV** heat pumps, provide greater efficiency and more reliable cooling and heating than ever before. Compared to other electric strip heat or electric heating elements that have a COP (Coefficient of Performance) of 1.0, heat pump heat proves consistently better efficiency with a COP >1 and can be over 2.0.

Reliable energy efficiency is important as homeowner perceptions of consistent temperature levels in the home have decreased from 73% to 65%, likely due to more people working remotely and spending a greater amount of time at home, causing them to notice inadequate temperature distribution more often[ii]. Even with this increased awareness, central heat pumps received the highest rating for having the most consistent temperature in all rooms, compared to all other HVAC equipment types[ii]. This may be due in part to better air flow in a home with a heat pump relative to homes with a gas furnace or radiant heat.

In humid climates where the temperature drops below freezing, heat pumps may experience frost or ice buildup on the outside unit. To clear this frost or ice, a defrost mode is initiated, which may cause a loss of heating airflow in the house. More advanced heat pumps utilize a supplemental heat source, like electric heat, to continue to heat during this defrost mode.

Heat pumps are an extremely affordable and reliable option. By taking advantage of available incentives, the initial investment in a heat pump system is comparable to the cost of a traditional HVAC system. Homeowners are also able to appreciate savings on their monthly energy bills due to the increased efficiency provided by a heat pump or dual-fuel system while still maintaining a comfortable home environment year-round.

Stacking and Saving with Homeowner Incentives

As a result of the energy-efficiency benefits of heat pumps, there are a variety of rebates and tax credits available for homeowners considering making the switch. Both federal and state governments are offering financial incentives to those who make the investment and even some utility companies are providing rebates. This represents a tremendous opportunity for dealers to sell the many benefits of heat pumps while also explaining to homeowners the positive impact on their bottom line.

While many utility companies run their own programs, the U.S. government also re-launched the **Energy Efficient Home Improvement Tax Credit** – part of the 2022 Inflation Reduction Act (IRA). This credit, better known as 25C, is the program everyone should be aware of as it increases tax credit limits for high-efficiency equipment including eligible heat pumps. Through this program, homeowners can receive $2,000 in tax credits for the installation of a qualifying energy-efficient heat pump. The 25C tax credit will remain effective through 2032. Qualifying units must meet or exceed the highest CEE efficiency tier that is not the advanced tier. There are no income requirements for the 25C tax credit, making it accessible to any homeowner who is interested.

More importantly, customers may be able to combine these tax credits with any rebates that might be eligible through the **U.S. Department of Energy's Home Energy Rebate Program**, which is designed to incentivize homeowners with subsidies to upgrade their homes with more energy efficient units that are better for the environment.

In 2021, the Government of Canada launched the Canada Greener Homes program, which offers Canadians up to $600 after completing mandatory pre- and post-retrofit EnerGuide home evaluations as well as up to $5,000 in rebates for energy efficient systems installed between the evaluations. This initiative aims to help restore the environment and allow Canadians to make energy-efficient upgrades to their homes while saving on their monthly energy bills.

Rebates Driving Adoption

The common theme among the U.S regions experiencing the highest rate of heat pump purchases is the presence of local utility companies offering strong mid-stream utility rebate programs. In these states, homeowners tend to have a better understanding of the rebate programs, thus a stronger incentive to adopt heat pumps. A 2023 market research report conducted by Lennox found states **with extensive utility rebate programs, such as California, Missouri, Iowa and Washington, are seeing a higher percentage of homeowners installing energy efficient systems** – including both heat pumps and dual-fuel systems. In May 2023, Lennox experienced a record total of dealers and companies participating in these rebate programs, submitting over 5,000 claims in one month[iii].

Source: Lennox Market Share Insights by Leidos

HVAC manufacturers and dealers have an opportunity to use segmented research to increase market shares in regions with extensive rebate programs. In addition, dealers have the ability to leverage data to strengthen regional partnerships and homeowner education to drive heat pump adoption in states where market shares are lower or rebate programs are less common.

Understanding Heat Pump Installation and Maintenance

While heat pumps look and work similarly to air conditioners, they're certainly not the same. The installation process for heat pumps is more complex due to slightly more wiring work. Another important step in installing a heat pump is ensuring the refrigerant is properly charged based on the current weather conditions. Charging information is provided on the charging label, which can be found on the inside of the unit access panel. As with any equipment installation and maintenance, proper training and adherence to the manufacturer's instructions are paramount. **The purchase of a digitally communicating smart thermostat, such as the Lennox S40 Smart Thermostat, along with digitally communicating equipment can reduce the need for extra wiring to control all functions, even in dual-fuel systems.**

There are numerous resources available for dealers to fully understand the ins and outs of selling, installing and servicing heat pumps. On **LennoxPros**, Lennox offers a library of step-by-step trainings for dealers ranging from 5 to 20 minutes in length on how heat pump

technology operates. In this resource, dealers can also find a series of classes that provide more detailed instructions on installation, maintenance and service.

The Future of Heat Pumps

Heat pumps have come a long way over the years, and they're still improving. Heat pumps – like other smart appliances – will continue to learn and predict when to run to maximize both air comfort and energy efficiency in the home.

Additionally, the functionality of heat pumps will continue to expand, such as the growing interest in the use of heat pumps to control the temperature of a home's water supply in addition to air comfort.

Ultimately, as technology continues to advance to better serve customer needs and drive efficiency, dealers serve as the greatest connection point between HVAC manufacturers and homeowners to convey the latest heat pump and dual-fuel benefits. Whatever the future holds, heat pumps will play a pivotal role in the HVAC business and serve the residential landscape with an energy efficient option for homeowners in any climate. To learn more or become a Lennox dealer, visit **LennoxPros.**

> "As we look ahead to the future of HVAC, we are confident that heat pumps will be a key driver for continued innovation within the industry. It's our dealers who play a vital role in the education and adoption of these advanced technologies by conveying the benefits of these products through the long-standing relationships they've made with homeowners.
>
> ***–Gary Bedard,*** *EVP & President, Lennox Residential Heating and Cooling*

[i] "Heat Pump Market Size, Share & Trends Analysis Report By Technology (Air Source, Water Source), By Capacity, By Operation Type, By Application (Residential, Industrial), By Region, And Segment Forecasts, 2023 – 2030", Grand View Research, May 2023, retrieved 3 August 2023, https://www.grandviewresearch.com/industry-analysis/heat-pump-market

[ii] "2022 American Home Comfort Study", Decision Analyst, Q1 2022

[iii] "Lennox Market Share Insights", Leidos, June 2023