NORTHEAST REGION FACT SHEET






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Comparative Analysis of Residential Heating Systems Study 2010

Overview

Evaluating 14 different heating systems in 16 locations across the United States in both new and existing homes, this 2010 study measured each system's comparative equipment and installation cost, annual operating cost, carbon dioxide (CO_2) emissions, and return on investment (ROI). The study used regionalized 2009 energy price data from the U.S. Energy Information Administration and did not consider equipment maintenance costs. Systems were evaluated for new homes and as efficiency upgrades for existing homes.

Overall findings

The study revealed that selecting the optimal home-heating system is a balance of several factors, including upfront costs, efficiency and monthly operating costs, ROI, and long-term carbon emissions. Propane systems performed very strongly both as a primary option, and as a backup heating source when paired with technology such as air-source heat pumps (ASHPs) in "dual fuel" systems.

Northeast Region overview

Fuel oil is a common energy source for home heating in the Northeast. In Burlington, Vt., and Buffalo, N.Y., the two Northeast markets sampled in the study, roughly 40% of households use fuel oil to heat their homes, typically with a boiler unit in the basement.

Natural gas is not available to a significant number of homes in the region. The demand for a reliable, cost-efficient, and cleaner energy alternative is on the rise.

In an efficiency upgrade scenario examining alternatives to installing a standard efficiency fuel oil furnace in an existing home, a high efficiency propane furnace has an immediate payback.

Northeast Region findings: cost

Based on an analysis of typical housing and energy pricing for multiple cities in the Northeast, the study arrived at these conclusions on heating system costs:

- In an efficiency upgrade scenario examining alternatives to installing a standard efficiency fuel oil furnace in an existing home, a high efficiency propane furnace has an immediate payback. This means that it costs less to purchase and to operate than the standard fuel oil furnace. A high efficiency fuel oil furnace would pay back in 3-4 years compared to the standard efficiency fuel oil furnace, while a GSHP system has a payback greater than 15 years.
- In this same efficiency upgrade scenario, ASHPs have an infinite payback compared to the baseline system. In other words, the data for these Northeast locations shows that ASHPs have both higher first costs and higher operating costs. Electricity prices for the two locations analyzed averaged 16.4 cents/kWh.
- ASHPs are also a less effective efficiency upgrade choice, because they offer a payback rate 12 times higher than a 95% AFUE propane furnace. Adding a high-efficiency propane furnace as a backup can cut this payback considerably.

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Northeast Region findings: environment

Highlights from the study's findings on the environmental performance of propane versus competitive fuels include:

- A standard-efficiency 78% AFUE propane furnace emits about 32% less CO_2 than a comparative 78% AFUE fuel oil furnace, because fuel oil combustion is more carbon-intensive than propane combustion.
- Over the average life cycle of a furnace in the above scenario (15 years), that difference in CO_2 emissions is equivalent to what would be sequestered by 48 medium-growth tree seedlings over 10 years.

Conclusion

Energy-conscious homeowners shopping for a home heating system almost always ask a construction professional: "Which system costs the least to operate and is the cheapest to install?" This study shows how that question warrants a careful answer, one that covers first costs as well as energy costs.

For eco-conscious homeowners looking to reduce their home's carbon emissions, propane systems offer a compelling choice.

For eco-conscious homeowners asking "Which system has the lowest carbon emissions footprint?" it's clear that propane systems outperform fuel-oil systems in the Northeast. And when it comes to simple payback rates, high efficiency propane furnaces offer immediate paybacks and future energy savings when compared to installing a standard efficiency fuel oil furnace.

Because residential heating systems are generally replaced every 12 to 18 years, construction professionals have ongoing opportunities to improve the energy and environmental performance of residential heating systems across the United States.

About the author of the study

Newport Partners LLC, a building industry research firm based in Davidsonville, Md., conducted this study in 2010. Newport Partners specializes in the analysis of building systems' energy performance.

For more information

Download the full heating analysis study at buildwithpropane.com.

For more information on the reliability, efficiency, and performance of propane furnaces and boilers, contact Tracy Burleson, PERC director of residential programs, at 202-452-8975 or tracyburleson@propanecouncil.org.

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