PROPANE
EXCEPTIONAL ENERGY®

Train Right. Build Better.

Whole-House Analysis of Energy Efficiency Upgrades for Existing Homes

Replacing an existing heating oil furnace

with a high efficiency propane furnace saved over four metric tons of CO_2 annually.

Overview

This 2010 study by Newport Partners LLC, was conducted to help homeowners make informed decisions when prioritizing energy upgrades for their existing home. The study's unique research evaluated dozens of energy efficiency upgrades (referred to as "energy efficiency measures" or EEMs) for their energy, economic, and environmental performance at 10 locations across five climates zones. While many systems were evaluated in the study, special emphasis was given to the performance of propane systems.

Situation

Residential buildings consume roughly 20 percent of the energy used in the United States. Thanks to modern energy codes and equipment standards, new homes typically perform at a much higher energy efficiency level than older homes. New opportunities for increasing existing homes' energy efficiency have attracted the attention of utilities, and state and federal government, which have all responded by developing incentives and programs to encourage "energy retrofits" across the country. With a wide variety of energy upgrades to choose from, homeowners are challenged to select the ones that will have the greatest impact on their utility bills and the environment.

Key findings

The study's full report arranges findings by climate zone for each EEM evaluated. Highlights among these findings include the following insights:

- Replacing an existing heating oil furnace with a high efficiency propane furnace. In the Northeast, this choice had the same payback as selecting a standard efficiency heating oil furnace, but saved over four metric tons of CO_2 annually. These emissions savings were nearly enough to offset most of the annual CO_2 emissions of a standard automobile.
- Specifying a high efficiency propane furnace in lieu of a standard efficiency propane furnace. For this measure, a payback of one year was achieved in mixed humid, cold-very cold, and Northeast regions, with associated annual emissions savings of 2.5–3.8 metric tons of CO_2 — higher emissions savings than any other lighting or appliance EEM analyzed across all climate zones.
- The dual-fuel system: pairing a high efficiency air-source heat pump (ASHP) with a high efficiency propane furnace. In all climates but the hot-humid and hot-dry/mixed-dry, the dual fuel system had simple paybacks of 4 to 6 years, with the highest associated annual emissions savings of any EEM in the study, at 7.3 metric tons of CO_2 when chosen over a standard ASHP in a mixed-humid climate. These savings were sufficient to offset the annual CO_2 emissions of 1.3 passenger cars.
- Specifying a propane tankless water heater over an electric unit. In the Northeast region, a propane tankless water heater had a payback of 5 years and the highest annual emissions savings at 0.62 metric tons of CO_2. The propane tankless water heaters are also attractive in that they have a life expectancy 50 percent longer than storage units and an hourly hot water delivery rate nearly triple that of electric storage units.

- Selecting a propane clothes dryer over an electric clothes dryer. This measure had a payback of 3 to 6 years with annual emissions savings of 0.1 to 0.3 metric tons of CO_2. These emissions savings are three to four times greater than the emissions savings of an Energy Star refrigerator, another appliance upgrade that was analyzed. The propane dryer's payback is also shorter than the 5 to 7 year payback for an Energy Star refrigerator.
- Fluorescent lighting (e.g. CFLs) and air sealing of the building envelope. Replacing incandescent light bulbs with 100 percent fluorescent lights had a payback of less than one year, while air sealing was expected to pay back in 1 to 3 years, regardless of the climate.

Conclusion

Careful selection of energy efficient propane appliances, water heating equipment, and space heating equipment can result in cost effective energy and emissions savings in residential retrofits. Homeowners should use the results of this study to plan ahead and proactively replace targeted mechanical systems that are near the end of their life with high efficiency equipment that will yield good returns on investment.

Careful selection of energy efficient propane appliances, water heating equipment, and space heating equipment can result in cost effective energy and emissions savings in residential retrofits.

About the author of the study

Newport Partners, LLC, of Davidsonville, Md. Newport Partners performs technical, regulatory, and market research and analysis related to the built environment, with a specific focus on the energy performance of buildings and building systems.

For more information

Download the full heating analysis study at buildwithpropane.com.

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

Propane Education & Research Council
1140 Connecticut Ave. N.W., Suite 1075
Washington, DC 20036