

BUILDING BACKGROUND

PAOLI RESIDENCE

Paoli, PA (Chester County)

BUILDING USAGE
Single Family Residence

OCCUPANTS
3

SIZE
2400 sq ft

STORIES
1 1/2

YEAR BUILT
1957

START YEAR FOR ENERGY MANAGEMENT
2011

ENERGY EFFICIENCY TYPOLOGY
Air Sealing and Insulation

CONTRACTOR INFORMATION
Orange Energy Solutions
1395 Lawrence Road
Havertown, PA 19083
610.449.2444
orangeenergysolutions.com

OVERVIEW AND SCOPE

The Residence

The owners purchased this 3-bedroom, 2-bathroom ranch-style home in Paoli, PA in 2005. The husband and wife live in the house with their son.

In this particular home, one of the bedrooms lies between an uninsulated garage and the attic, and as a result, the temperature in the bedroom was often colder or warmer than the rest of the home. The family room was also prone to these temperature differences. The family enlisted the services of Orange Energy Solutions to resolve these comfort issues.

Orange Energy conducted an initial energy assessment of the home that included a blower door test, and used infrared imaging to identify areas of the home where air leakages were occurring. After the energy assessment, Orange Energy presented the homeowners with a comprehensive list of upgrades that could be made to the home. The homeowners chose to increase the amount of air sealing and insulation in the attic, which they believed was the most cost-effective way to improve the comfort and energy efficiency of their home.

The homeowners also participated in the region's EnergyWorks program, funded by a grant from the US Department of Energy. EnergyWorks connects home and business owners with rebates, tax credits and low-interest loans to perform energy efficiency improvements. Through EnergyWorks, they were able to receive a \$300 rebate on their home energy assessment by implementing at least \$1,000 of the improvements recommended. The availability of this rebate encouraged the homeowners to go forward with the work. For more information, visit <http://energyworksnow.com/>.

PROJECT DETAILS

The initial energy assessment's blower door reading, quantified in CFM50 (cubic feet per minute at 50 pascals of pressure), for the Paoli home was 3205 CFM50, or 0.62 air

changes per hour (ach). For reference, an ach of 0.80 is considered drafty, and an ach of 0.24 is considered tight. Orange Energy set a goal for the Paoli residence of 0.45 ach, or 2400 CFM50, thought to be achievable through a the insulation and air sealing measures.

Insulation and Air Sealing

When constructed poorly, a home's attic and knee walls are sources of drafts in the home, so in the process of making energy efficiency improvements, the first step the contractors took was to sheathe the knee walls with rigid foam board. Orange Energy also installed an attic hatch air sealing and insulation kit, and weather stripped the attic's second access point and install rigid foam board to the back of that panel. Recessed lights can also let air in, so installing light box covers and air sealing above these lights helped to reduce drafts, as well. A chimney balloon was also installed. As its name suggests, this device is an inflatable plug that prevents drafts from coming into your home through the chimney.

Venting and Air Circulation

When making a house "tighter," or less leaky, it is important to install ventilation measures to control moisture and humidity. Otherwise, odors, mold, mildew, dust mites, and other indoor air pollutants will stay trapped in the house. To vent out moist and humid air from the bathroom, Orange Energy re-routed the bathroom fan from the attic space to the exterior of the home, according to building code.

PROJECT OUTCOME

Once the work on the home was complete, Orange Energy conducted a follow up blower door reading to verify the reduction in air flow that was achieved. The follow-up reading revealed a 24% reduction in draftiness, which is expected to save the homeowners on heating and on cooling costs, and considerably improve the thermal comfort in the home.

The homeowners felt that the information they received during the home energy assessment was invaluable to their understanding of their home and helped them better appreciate the benefits of energy efficiency improvements.

Although the homeowners were initially unsure about undertaking the project, they reported that they were pleased with the results and the first night after the improvements were made, the house felt noticeably more comfortable.

The homeowners' positive experience with the results they saw convinced them to have insulation work done in their garage, as well, and they reported that they might do even more energy efficiency work to further increase comfort of their home and save on their monthly bills.

"We support the goals of the Energy Works program and are glad we could participate. Thanks for making our house a bit cozier. Cutting our energy consumption is good for the environment and we look forward to reaping the savings too!" - Homeowner from Paoli

ENERGY AND COST SAVING ESTIMATES

Blower Door (Draftiness) Reduction: 24%
 Natural Gas Cost Savings/ Year: \$16.14/ yr
 Natural Gas Savings/ Year: 41.53 therms/ yr
 Natural Gas Use Savings: 3.45%

ENERGY SAVINGS INVESTMENTS

Install master bathroom exhaust fan	\$650
Install hatch insulation, air sealing package, sheath and insulate knee wall, and air seal recessed light covers	\$1675
Total	\$2325