



BUILDING BACKGROUND

## MERION RESIDENCE

Merion, PA

**BUILDING USAGE**  
Single Family Residence

**SIZE**  
4065 sq ft

**STORIES**  
3

**YEAR PURCHASED**  
2008

**START YEAR FOR ENERGY MANAGEMENT**  
2011

**ENERGY EFFICIENCY TYPOLOGY**  
Air Sealing and Insulation, Windows and Doors

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

## OVERVIEW AND SCOPE

### The Residence

The homeowners, Charles and his spouse, purchased their 4 bedroom, 3.5 bathroom Merion home in 2008. The home is nearly 100 years old, and was very expensive to heat and cool. Searching for help with energy efficiency improvements, Charles visited PECO's Web site, where he learned about EnergyWorks. EnergyWorks is a 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, Charles was able to receive a rebate on their home energy assessment by implementing at least \$1,000 of the improvements recommended. For more information, visit <http://energyworksnow.com/>.

GreenerU Consultants performed an energy assessment on their home, and suggested a number of measures to improve thermal comfort, reduce energy use, and lower costs. Charles then contacted Orange Energy Solutions to perform some of the improvements recommended.

## PROJECT DETAILS

An initial blower door test was performed to measure the amount of air that was leaking out of the home. The test revealed the house was over three times leakier than the standard, which is the equivalent of a 20 by 20 inch hole on the house. A house should exchange about 1/3rd of the volume of air it has inside of it every hour in order to move indoor pollutants, excessive moisture and harmful particles out of the house. If the air is exchanged more frequently, however, the HVAC system must use an excessive amount of energy to heat or cool the new air being introduced. Based on this number, the building analyst recommended a number of solutions, which included air sealing and insulating the rim joists and the knee walls above the third floor, caulking around windows and sills, and installing weather stripping around doors. Charles contacted Orange

# HOMEOWNER FROM MERION

Merion, PA

Energy Solutions to perform some of the improvements recommended.

## Air Sealing and Insulation

Orange Energy air sealed behind the home's knee walls and installed 4" of open cell spray foam to improve the R-value of the existing insulation from 19 to 37. R value is a measure of resistance to heat flow. The higher the R-value, the greater the effectiveness of the insulation. Knee walls are a typical leaky area in a home. The inside of the exterior brick wall was insulated with R-10 rigid foam board insulation, which was then air sealed into place. Orange Energy also air sealed and insulated the band joists in the basement with 2" of closed cell foam, which improved the R-value to 14. Band joists can often be the source of significant heat loss, so it is especially important to air seal and insulate these areas. Leakages identified in the living space were also air sealed. To improve overall efficiency of air circulation and to keep the HVAC system from working too hard, Orange Energy sealed the seams of the duct system with duct mastic. They also caulked all duct boots to the drywall or subfloor so that air conditioned or heated air was not hitting walls and potentially causing moisture and mold problems.

## Windows and Doors

The basement windows were caulked permanently shut since they were not being used and were leaking air. Orange Energy also weather stripped and installed a door sweep, and 2" of rigid foam board insulation on the back of the basement door. They replaced, repaired and adjusted all door sweeps and weather stripping on exterior doors to reduce air leakage.

### PROJECT OUTCOME

Electricity.....	\$84
Oil.....	\$799
Total.....	17% \$883

## PROJECT OUTCOME

A post blower door test was conducted after the work was done which revealed a 38% improvement in air infiltration! Basic air sealing and insulation usually results in a 10-15% improvement in air infiltration, so the work that was done was very effective. As a result of the improvements that were done, the homeowners witnessed total energy savings of 17% and \$883 per year. The monthly energy cost savings are expected to exceed the monthly loan payment.

Charles reported that he felt a difference in his home immediately. He also was extremely pleased with Orange Energy's work, reporting that they were very straightforward, thorough, and chose the measures that would give the biggest return on his investment. Charles emphasized the importance of taking the time to get different opinions and quotes.

As a result of the work that was done, Charles is considering implementing a second phase of work. This second phase would include installing five recessed light covers and a comprehensive air sealing package of all of the penetrations in the flat ceiling, insulating the flat sections of the third floor ceiling with cellulose insulation to achieve an R-value of 49, installing air tight recessed light covers, and adding insulation overall as needed to achieve the greatest R-value possible. The last step would be to install low-e storm windows that reduce heat flow through the glass.

### ENERGY SAVING INVESTMENTS

Air seal and insulate behind knee walls; insulate exterior brick wall.....	\$2250
Basement: air seal, insulate, and weather strip band joists, windows, and doors .....	\$1000
Air seal living space; repair door sweeps and weather stripping; seal seams of the duct system; caulk duct boots to the drywall or subfloor .....	\$1000
Total .....	\$4250