

The Rahaley Residence

After meeting with the homeowner to establish guidelines for the home's particular performance characteristics, an energy audit was performed by an EnergyLogic technician using a blower door and infrared thermography to identify thermal weak points in the home's envelope. The home's HVAC (heating, ventilation, and air conditioning) system was also inspected, including the air ducts, and a report was prepared to categorize key areas where the home's energy performance and comfort levels could be most cost-effectively impacted. The greatest opportunities for improvement for this residence fell into three general categories, which themselves are generally representative of many Colorado homes that receive energy audits and retrofit work.

Attic Air-Sealing and Increased Insulation

Attics, even in relatively new homes like the Rahaley's, are very often the largest source of wasted energy and compromised comfort. This was very much the case here, where attic insulation, only marginal when new, had been compacted to a point where it offered just a fraction of the insulating value required for proper performance. Additionally, there were several points of major air leakage in the attic, from framed penetrations surrounding exhaust flues to improperly sealed can lights to a poorly-performing attic hatch. Further, the "knee walls" between attic space and living space were poorly detailed and lacked air-barriers, which contributed markedly to the cold rooms upstairs. EnergyLogic performance contractors were able to fully air-seal all attic penetrations with closed cell foam, to replace the hatch with a super-efficient Structural Insulated Panel (SIP), and to insulate the attic with blown cellulose to levels more than twice the level initially observed. This combination of sealing air leaks and dramatically improving the thermal barrier in the attic had significant and immediate impacts upon energy use and comfort levels throughout the home.

Air-Ducts – Sealing and Insulating

The conditioned air delivered to living spaces within a home is wholly dependent on the quality of the ducts used in getting it there, and the Rahaley home offered many opportunities for improvement in this key area. Ducts in "unconditioned space", such as the attic and crawl space, are especially critical sources of energy loss, and this home featured ducts in both locations that warranted significant work. Ducts in the attic were sealed with mastic at all joints and covered with high levels of insulation, ensuring that air delivered from the furnace to upstairs bedrooms is actually reaching that destination, and at a temperature that provides consistent comfort levels. Similarly, the leaky ducts in the basement crawl space were sealed for air tightness, and butterfly dampers were installed in the bathroom fan ducts to prevent both the intrusion of outside air and the escape of conditioned indoor air. The Rahaleys noticed notably improved comfort in their home once the ducts were tightened and insulated, as well as decreased utility bills from not trying to heat their attic all winter long.

Crawl-Space Upgrade

The Rahaley house was built during a time when "vented" crawl-spaces were the common practice: small vents at several points along the crawl-space walls were thought to ensure that the area stayed dry, when in fact the space became an unconditioned no-man's-land that often led to moisture issues

and compromised energy efficiency. The solution here is to turn the crawl-space into something of a miniature basement – dry, conditioned like the rest of the house, and sealed tightly against outdoor air. EnergyLogic performance retrofitters applied a thorough coating of closed-cell foam at the “rim” of the crawl-space, where the foundation wall meets the floor joists and where large amounts of air are commonly allowed to infiltrate the home. The vents were sealed, and the crawl is now a well-insulated space that, in combination with the newly sealed ducts within it, keeps the rooms above it warm and dry.

Measurable impacts

Some performance characteristics of a home can be accurately calculated before and after energy retrofit work is conducted: overall house tightness, volume of air delivered to individual rooms, and heat loss through the thermal envelope are some examples. The air-sealing measures described above led to an increase in the air-tightness of the Rahaley residence of over 25%, an impressive amount that most homes in Colorado could easily replicate with similar measures. Infrared diagnostics confirm that wall and ceiling surfaces stay much warmer in the winter and cooler in the summer after sealing and insulation work, as well, which immediately brings improved comfort levels throughout the home. Brian Rahaley reports that summer air conditioning demands were taking a heavy toll on his utility bill, but that after the retrofit work he rarely needs to use his AC. The overall cost of this project were remarkably modest, \$1,137, and there was no requirement for the Rahaley family to take on the considerable expense of a new HVAC system or new windows throughout the home, despite the significant and immediate impact to the monthly family budget and the overall livability of the residence.

If you have any questions regarding an energy audit for your home, please feel free to contact us at anytime by writing info@nrglogic.com or calling 1.800.315.0459