



My Home Energy Audit

EARLY THIS YEAR, the owners at TruTech Tools voted to contribute toward an energy audit for all employee homes. Since I have been talking the energy talk for years, I finally bit the bullet and had a full-blown energy audit done on my home. I learned a lot by watching and participating in the process. In fact, as I write this, the insulators have spent most of the day air sealing!

Doing the Dance

Our energy audit was performed by The Energy Doctor (Rhett Major) of Irwin, Pennsylvania. The first step was a walk around the house looking for exterior signs of energy loss (gaps in the envelope, snowmelt patterns) and issues that might affect building durability (such as water infiltration). Then a second walk around the entire house, from basement to attic, paying special attention to pathways for air infiltration. Photo documentation is essential if you want to remember all the details; 197 photos were taken during my audit.



BILL SPOHN is CEO and co-owner of Akron, Ohio-based TruTech Tools Ltd. Spohn recently joined *Home Energy's* board of directors.

The auditor then walked systematically around the inside of the house (“always take right turns”), taking thermal and visual images of the walls that exhibited the most energy loss. (Major calls this the blower door/thermal dance.)

Oops and Double Oops!

In 1999, when we bought our ten-year-old, 4,400 ft², custom-built home, we saw a lot of value: siting, layout, and interior features, plus (for me) 5/8-inch wallboard, a 12-course block

basement, closely spaced studding and a 100,000 Btu/h Lennox Pulse furnace with a 4-ton, 10 SEER air conditioner (top-notch for 1989), to name just a few items. However, my energy audit revealed some shocking results.

The Energy Doctor pointed out areas for improvement, with target costs and payback periods. Since our main purpose was to make our home more comfortable, we realized that the payback for some of the recommended measures was relatively unimportant to us.

We were stunned to see that air leakage was nearly 5,000 CFM₅₀. Standard calculations indicate that this is about 650 square inches (cumulative) of leakage area to the outside. It's like leaving a window sash open 24/7/365! The goal was to cut it down to 3,711 CFM₅₀.

Tighten Up!

After deciding which measures to install from the menu of choices and paybacks, Rhett subcontracted Andy Haak of Insulwise (Pittsburgh, Pennsylvania) to fix the primary sources of air leakage: huge openings above the two upstairs shower enclosures, and chases around the woodstove flue and waste stacks. Secondary but more numerous were all the gaps in the drywall and the penetrations for wiring in the attic deck, plus rim joist leakage in the basement sill plate area.

In addition, a new attic hatch cover was built, which helped to eliminate the 10 Pa connection between the attic and house, while blown-in cellulose was added to increase the effective attic deck R-value to about 49.

Jim Bergmann, my business partner at TruTech Tools and an HVAC contractor and educational expert, was contracted to do the



Snowmelt patterns provide exterior signs of energy loss.

HVAC sizing (load calculation) and replacement work. We ended up reducing our system size by about 25% with a 95.3% efficient furnace at 75,000 Btu/h (with an electronically commutated motor) and a two-stage, 3-ton, 15.5 SEER air conditioner with a beautiful, touch-screen, “learning thermostat” with outdoor sensors—I love sensors!

Your Mileage May Vary

Our blower-door test numbers beat the goal of 3,711 by achieving 3,554 CFM₅₀. That's about a 30% reduction in air leakage, which should reduce load by 30% and match well with the HVAC system size reduction of 25%.

Since we supplement our heat with a catalytic wood-burning stove, a separate fresh/combustion air supply was installed near the woodstove. Its location close to the woodstove should eliminate the cold draft caused by pulling fresh air from air infiltration points around the home.

Already the air sealing and HVAC retrofits have made our house more comfortable; we are noticing fewer drafts, and the house feels quieter. And in addition to controlling our “expensive air,” the attic penetration and rim joist sealing will help keep out pests—stink bugs, Asian beetles, yellow jackets, and mice! 🐛