170 Security Circle
Suite 104
Athens, GA 30605
706-248-0821

Home Energy Audit

Customer: John Customer	Auditor: Brian Young	BPI# 5015564
Address: 0000 Deer Run Drive	Date: 08/17/2010	Type: Single Family
City: Marietta	State: GA	Zip Code: 30068
House Age: 34	# Stories: 2	Foundation: Basement
Garage: 2 car attached	Square Footage: 2,850	Volume: 25,650

Homeowner Concerns: High electric bills and uncomfortable rooms.

About Home Performance with ENERGY STAR®

Many homeowners pay high energy bills only to suffer from hot or cold spots, drafts, mold, and excessive dust. These problems are common signs of a house that is not properly insulated, has too many small holes and cracks that allow air leaks, and have a heating and cooling system that is improperly sealed, or lacks effective moisture control.

Now there's help: Home Performance with ENERGY STAR developed by the Environmental Protection Agency and the U.S. Department of Energy. It is a voluntary program for home improvement contractors who want to use a whole-house, integrated approach for diagnosing and solving a home's problems. Home Performance with ENERGY STAR standards helps to ensure comprehensive, unbiased recommendations.

Your home assessment

Your home was thoroughly checked in the following areas: insulation, air tightness, ductwork, mechanical equipment, windows, health and safety, indoor air quality, moisture management and indoor water use. Each energy-related recommendation is rated with a priority level of A (most urgent), B, C, D or no improvement needed.

Building Envelope and Air Tightness

The building envelope of a house consists of an air barrier and a thermal barrier. The air barrier eliminates cracks that cause uncomfortable drafts as well as allows insects, rodents and moisture to enter the home. The thermal barrier insulates the inside from the outside. To be effective, the two barriers should be continuous and in contact with one another.

Typically, as much as 25% of your heating and cooling dollars escape through unseen cracks in your home. These are usually found in attics, basements, duct systems, floors and around doors and windows. If you combine all of the cracks in a typical house it would be the same a leaving a door or window open all year long. Sealing air leaks also protects your home from mold and mildew by preventing moisture from entering the house through ceilings, walls and floors.

Making the Building Envelope Complete

Fixing gaps in the building envelope might entail sealing plumbing penetrations into the attic or repairing sections of missing insulation.

Blower Door Test

Air loss in your home was measured using a blower door which is an accurate method to measure and identify areas where air is escaping.

Your Home's Air Leakage, overall rating is: B – Important to address soon

Your homes air leakage is 0.65 air changes per hour (ACH). This means that every hour approximately 65% of your house's air will exchange with the outside just through the leaks and holes in the building envelope.

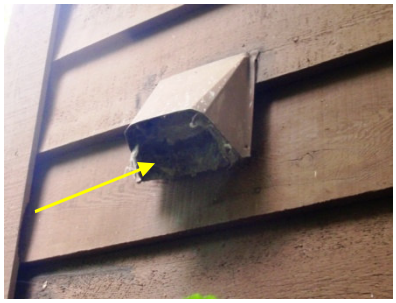
Large leaks were found in the attic access door, plumbing inspection door in the upstairs hallway, the attic access doors in the bonus room and the flue chase from basement to attic.

Medium leaks were found around the fireplace, backdoor, electrical control panel, dryer vent and the old attic access panels in the garage and laundry room.

Small leaks were found around the outlets, light fixtures, plumbing vents and other protrusions into the attic space.

Improvements:

- Leaks around the baseboard in the garage, door and old attic access will let carbon monoxide into the house from the garage. These leaks need to be taken seriously and caulk needs to be applied around all of the seams and cracks.
- Apply weather stripping to the attic door to create a seal.
- Use caulk to seal the plumbing access cover in the hallway and reinstall.
- Install weather stripping and a latching system to each of the bonus room attic access doors.
- In the attic exhaust flue chase, use foam board and caulk to seal the two floor joist openings. Use aluminum flashing or other non flammable material to create an air barrier of at least two inches around the exhaust flue. Use a fire rated caulk to seal close to the flue. Use foam board to finish sealing the attic floor and caulk the edges and seams.
- Use the same methods to seal the basement exhaust flue chase.
- Remove the door and decorative cover from the fireplace and use a fire rated caulk to seal between the wall and fireplace.
- Inspect the weather stripping on the back door. It may need replacing or the door may need adjusting to close tighter. Because the blower door was in the front door it was not tested for air leaks. It appeared to be in the same condition as the other doors and may need the same.
- From the basement, fill the cavity that the electrical wires run up to the main electrical panel with spray foam.
- The dryer vent needs cleaning from the outside so that it closes again.
- Caulk the old attic access panels in the garage and laundry room.
- Caulk or spray foam around the outlets, light switches and light fixtures inside the house.
- Disassemble the four can lights in the bonus room and seal any air openings with fire rated caulk. Replace the bulbs with compact fluorescents to reduce the amount of heat at the fixture.
- From the attic side caulk or foam any plumbing vents, pipes or holes for electrical wiring that go from the house into the attic space.
- Use spray foam to seal the plumbing holes under the sinks; most are already done.



Insulation

Insulation slows down heat flow through the building envelope. Insulation must be installed correctly to function well. Insulation that does not completely cover a surface, is compressed, or is falling out of cavities is not effective at stopping heat flow. Air will move around insulation and through openings in the air barrier so insulation is most effective when installed in conjunction with air sealing. R-value is a measure of the resistance to heat flow; the higher the R-value, the better the insulation.

For attics, the insulation options are usually installing batts or blowing in insulation such as fiberglass or cellulose.

If you have a power roof fan, it is recommended that it be disconnected or removed as studies have shown that the power needed to run the fan can cost more than the benefits. Also, conditioned air from the house can be sucked into the attic.

For basements and crawl spaces, the decision to insulate the floor above or the foundation walls depends on your house. If insulating a floor, a spray foam product is the only option that will continue to perform well in the long term. Batts, which are conventionally used, will unavoidably sag down or fall out over time.

Your Attic Insulation, overall rating is: C – Improving will provide some energy benefit

Your home has one inch of compressed fiberglass blown insulation corresponding to R-3 and two layers of R-13 fiberglass batts on top of it giving you an equivalent of R-29. This is close to the recommended R-30 so adding insulation may not be cost effective. You may want to use cellulose insulation to fill some of the low spots.

Your attic ventilation consisted of soffit vents, gable vents and two roof fans. This is an adequate amount of ventilation for your attic space.

Improvements:

Attic access door had no insulation; a fiberglass bat wedged under the ladder is a good start. Several companies sell access door insulation kits that help seal and insulate the attic door.

Your Basement/Crawlspace

Your uninsulated basement walls are outside the conditioned space and were not taken into the calculations. Your basement walls can be improved by attaching foam board to the walls minimum R-5 contiguous or firing out and installing R-13 fiberglass batts. The section that had fiberglass batts had lots of gaps and misalignment. The insulation is wider than the cavity spacing and needs to be cut down so that it fills the entire cavity with no air gaps.

Your Kitchen bay window

The underside of your kitchen bay is probably not insulated properly. From the basement, remove the fiberglass batts at the floor joist that goes out to the bay window. Insulation under the window should be in contact with the floor of the kitchen. Increase the insulation so that it fills the cavity then use foam board to seal the ends of the floor joist at the basement wall to keep air leaks out of the basement.

Your Exterior Walls, overall rating is: D- Least important to address.

Your walls have blown in fiberglass equivalent to R-10.5. The recommended amount is R-13 so improvements would not be cost effective.

Your Bonus Room, overall rating is B: Important to address soon

Improvements:

- The insulation on the walls has fallen down in places, does not fit properly, has gaps and is unsheathed. The insulation needs to be removed and new insulation installed; use R-18 with sheathing. Sheathing must be on the attic side.
- The floor joist under the bonus room is uninsulated and not sealed on the ends so outside air travels under the floor. It will be difficult to insulate and use foam board to seal the ends but if you can, it will make the room more comfortable and energy efficient.
- The access doors are uninsulated. Gluing an inch or two of foam board to the back of the door will help reduce the heat flow in and out of the room.
- Inside the attic space along the bedroom and closet, walls have cracks in the plywood sheathing. Seal the cracks with foam or caulk to reduce the air leaks.

Heating and Cooling Systems

Your heating and cooling systems use about half of your home's energy cost, so its efficiency is important.

Your Cooling System

You have a 2 ½ ton 12 SEER unit and a 2 ton 11 SEER unit which are both 16 years old and could be approaching the end of their life expectancy. New units must be at least 13 SEER and go up to 22 SEER in efficiency rating. Keep vegetation and debris away from and out of your outside condensing units.

Your Heating System

You have two Rheem 60,000 BTU systems that are 80.6 AFLE efficient. New units are in the 90% or better efficiency range. Change the filters and clean the blower fans.

Water Heaters

Water heaters can use as much as one third of a household's energy so improving efficiency can provide great savings. All tank water heaters are rated with an energy factor (EF), which indicates its efficiency. A new water heater's EF should be at least 0.63 for gas and 0.93 for electric.

Your Water Heater

Is a 6 year old, 40 gallon, gas unit with a 0.61 EF and R-6.7 insulation.

Improvements:

- Installing an R-6 or greater water heater blanket can save you 4-9% on your water heating cost.
- You have a small leak at the bottom drain. Try closing the valve and tightening the pieces. You might be able to put a cap on the threads.
- There was some insulation on your hot water line but it was incomplete. Insulate any hot water line that you can see and the first few feet of the cold line coming into the tank.

Duct System

All air that is heated or cooled circulates through the duct system and can be lost through any holes or unsealed seams. Ducts should be as tight as possible to ensure that conditioned air is delivered to rooms and not lost to attics, basements and crawl spaces. Supply duct leaks can lead to high energy bills and uncomfortable living space. Return leaks can pull mold, allergens and other particulates into your home. Duct leakage is the single largest waste of energy in most homes.

Duct Efficiency Test

Your home was tested with a duct blaster or flow hood. The duct blaster pressurizes the ducts to get a measure of total leakage in the duct system.

Sealing Ductwork

Leaky ductwork can be sealed if it is in good mechanical condition. Otherwise it may need to be replaced and the new ductwork sealed. Ducts located in attics and crawlspaces should be insulated as well as sealed. R-8 is required as a minimum in the attic and R-6 is required as a minimum elsewhere. Mastic, a thick paste that hardens is the best way to seal duct seams. It can be used on all types of ducts and provides a permanent seal. Tape will fail over time and is not recommended for sealing. Caulk is usually used to seal duct boots to the floor, wall or ceiling.

Your Ductwork, overall rating is: A - Essential item to be addressed immediately

Your upstairs ductwork was tested with a duct blaster and 65% of the air is leaking out. This is high and should be addressed immediately.

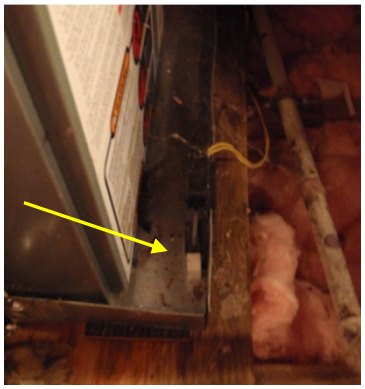
Improvements:

- In the attic, remove the insulation from around the air handler to expose all of the seams. Run the fan and feel where all of the leaks are. Turn the fan off, clean the seams, apply a layer of reinforcing tape then generously apply mastic to all of the seams. Allow time to dry and run the

fan again to make sure that all of the leaks have been sealed. Reinstall the insulation and replace any insulation that can't be reused.

- Inside the house, remove the grills from the supply and returns, mastic the duct boot seams and caulk the duct boots to the ceiling.

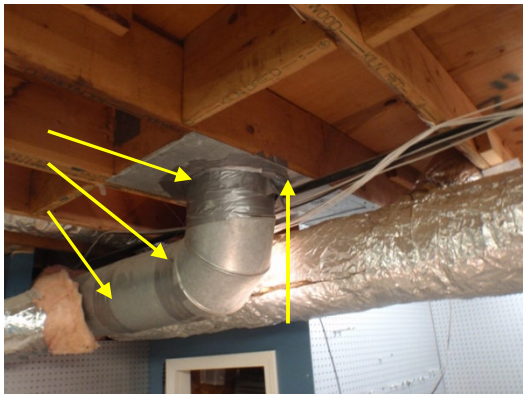
Your attic HVAC system has an overflow switch in the bottom drain pan that did not work when we tested it. If the condensation line gets clogged the condensate water will find its way into the pan and start filling it up. When it reaches a certain level it will raise the float on the switch and the unit should shut off letting you know that there is a problem. When we raised the switch the unit did not shut off like it should have. You should get an HVAC technician to service the unit and repair the float switch.

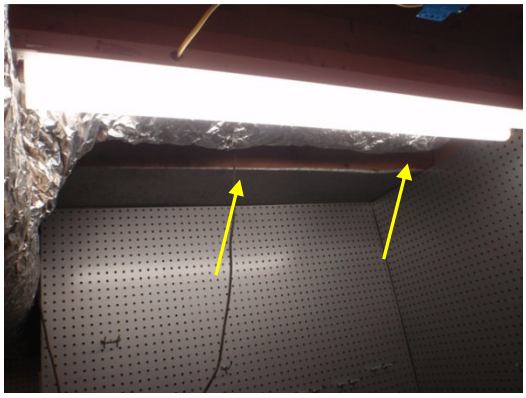


Your basement duct system was not tested for leaks because it is completely inside the conditioned space. One of the floor supplies uses the floor joist as the ducting and has duct tape on the elbow seams.

Improvements:

- The duct tape needs to be removed and mastic used to cover all of the seams. Mastic or caulk needs to be applied to the edges where the sheet metal meets the floor joist.





Windows

Effective windows increase comfort and save energy. However, replacing windows is not the most cost effective improvement compared to air sealing, duct sealing or adding insulation. In new windows, look for the Energy Star label to identify the most efficient windows, skylights and glass doors. The insulating ability of a window is measured by a U-factor. Solar Heat Gain Coefficient (SHGC) measures the ability to block out radioactive heat. Windows with a low-e coating have better SHGC values. Lower values for both U-factor and SHGC mean a better window.

Other options for improving windows include adding storm windows or solar shade screens, which block unwanted solar heat from entering the house.

Your Windows, overall rating is: C – Improving will provide some energy benefit

You have wooden single pane windows everywhere except in the bonus room which has two wooden double pane windows. Upgrading you windows will take a long time to recover your investment.

Indoor Water Use

Improving water efficiency in your home can save money and protect a valuable natural resource. Replacing an old toilet that uses 3 or 5 gallons per flush with a new model that uses 1.6 gallons or less per flush will save a great deal of water. New low flow showerheads will use 2.5 gallons per minute while providing the same pressure as older showerheads; this will conserve hot water.

Your downstairs toilet could be upgraded to a low flow toilet while your other toilets are already water efficient. Your sinks already have low flow aerators and your shower head is less than 2.5 gallons per minute.

Lighting and Appliances

Replace incandescent bulbs with compact fluorescents (CFL's). CFL bulbs use one quarter of the electricity of incandescent bulbs and provide the same amount of light. They also last longer which means fewer replacements. When you buy new home appliances, ask for models with the Energy Star label. These will use up to 50% less energy than conventional ones.

Improvements:

- You have several incandescent bulbs that can be changed to CFL's.

Health and Safety: Carbon Monoxide (CO)

CO is an odorless, tasteless byproduct of combustion. It is found in combustion fumes produced by cars, fireplaces, gas stoves, gas water heaters and gas furnaces. Breathing low levels of CO for a period of time may cause flu-like symptoms. Higher levels can cause illness or death. The greatest danger is in the winter when the windows are closed and gas heating appliances are being used.

Sealed-combustion furnaces, direct-vent and power-vented water heaters send combustion gases directly outside with no chance of mixing with the indoor air. With other systems, a pressure difference between outside and inside could cause back drafting, causing CO and other fumes to stay in the house

and not exit through the flue. Unvented gas space heaters pose the most danger. All of their combustion fumes stay in the living space. These should be disconnected and removed.

Recommendations:

- The CO level at your hot water heater tested very low and is safe.
- There are some leaks between the garage and the house and CO from the vehicles can enter the house. Caulk along the baseboards of the garage, door frame and the old attic hatch.
- Install a CO monitor on each floor of the house.

Health and Safety: Moisture and Mold

In the Southeast, mold can easily find conditions to thrive, and if it grows in and under homes it can create a health hazard. Mold needs moisture to grow, so keeping water away from the house reduces mold problems. Water enters the house as a liquid such as rain water seeping into the foundation and vapor from outdoor humidity, cooking or showering.

The ground around a house should be designed to drain surface water away from the foundation. When downspouts are extended far away from the home or when underground drain systems are designed well, water draining off the roof or through landscape is kept away from the foundation.

In a well-insulated, well-sealed house, indoor surfaces will stay warm enough in the winter to avoid condensation, a source of liquid moisture. When air conditioning is correctly sized, the equipment, which dehumidifies as well as cools, will run long enough to extract moisture from the air. Exhaust fans in the bathrooms and kitchen will remove moisture at their source.

In a basement with high-humidity problems, drainage issues in the yard are the most important items to fix.

Only one of your bathrooms has venting and it vents into the attic instead of outside the house. This was common practice in the past but today's building codes require it to be vented to the outside.

Drainage from the gutters was done well and directs the water far away from your house.

Improvements:

- Clean the two exit pipes on the front garage side of the house so that they can drain easier.
- Repair the broken angle below the kitchen window
- Securely reattach the drain to the gutter down spout near the basement door.

Health and Safety: Radon

Radon is a radioactive gas that can occur in some soils. Radon is odorless, colorless, and tasteless and can cause lung cancer if it builds up in your home. Testing is the only way to know if a house has a radon problem.

Choosing your home improvements

Use this Home Assessment report to help decide what work to have done, while taking into consideration your own needs and budget. In the long run, a comprehensive plan for energy and indoor air quality improvements, including insulation, air sealing and efficient heating and cooling is usually the best approach to making your home energy efficient, comfortable, healthy and durable.

Getting the improvement work done

The contractor who performed your Home Assessment may be able to provide some or all of the improvement work. The assessment contractor can provide a list of improvement contractors who are qualified to undertake the work.

Final Tests

After the work has been completed, contractors with Home Performance with Energy Star are required to “test out”, repeating the tests performed during the comprehensive Home Assessment. Make sure to have these final tests completed and be present for them. They ensure that the work was performed properly and that the home meets the program’s health, safety and technical requirements. The results are included in the Certificate of Completion and submitted for documentation. While the assessment contractor is responsible for the accuracy and completeness of the final test, he may choose to have the improvement contractor conduct the tests.

Accepting the Job – the Certificate of Completion

When the work in the work scope agreement and the final test are done, the contractor will prepare a Certificate of Completion for your review and signature. The Certificate of Completion is your signed statement to the contractor and to the program that the work for this project has been completed. Do not sign the Certificate of Completion until the work is completed. Participating contractors will provide the customer a written warranty on labor and materials for a minimum of one year. Equipment installed will carry the manufacturer's warranty and any optional extended-warranty coverage that the customer selects.

Third-party verification

Southface Energy Institute provides contractor training and inspects a sample of assessments and jobs for quality and program compliance. The contractors who participate in the program warrant their own work. Southface does not warrant the products and/ or services of any participating contractors.

Further Questions

Further technical information and program standards are available at www.southface.org. Southface welcomes comments on the program. Please direct comments and questions to homeperformance@southface,org.