



**TERRALOGOS**  
ENERGY GROUP

# TerraLogos Energy Efficiency Report



PREPARED FOR

Michael and Debbie Bloomfield  
1985 Electric Circle  
Baltimore, MD 21214

DATE OF ENERGY AUDIT

July 22, 2009

**Abridged from 28 Page Report**

ENERGY AUDITORS

Frank Lee and Becky Arnold

**TERRALOGOS ENERGY GROUP**


1500 Bolton Street, Baltimore, MD 21217  
410.225.5040



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## Property Information

<b>Owner</b>	Michael and Debbie Bloomfield	
<b>Location</b>	1985 Electric Circle Baltimore, MD 21214	
<b>Phone Number</b>	410.231.1897	
<b>Date of Energy Audit</b>	July 22, 2009	
<b>Energy Auditor</b>	Frank Lee and Becky Arnold	
<b>Year Built</b>	1984 Owner since 2006	
<b>Type and Exterior</b>	Detached, brick	
<b>Exposure</b>	The front of the house faces northeast with solar exposure on the northeast side. The house is exposed to north winds.	
<b>Building Size</b>	50' x 40' x 3 stories 22' x 14' x 2 stories 28' x 10' x 1 story	
<b>Conditioned Space</b>	Area: 6,896 sq. ft.                      Volume: 58,600 cu. ft.	
<b>Garage</b>	Attached	
<b>Basement</b>	Unfinished, semi-conditioned, concrete block walls	
<b>Attic</b>	Unfinished, unconditioned	
<b>Roof</b>	Slate, medium color	
<b>Windows</b>	Double hung, wood, double glazed windows	
<b>Thermostats</b>	3 Programmable	
<b>Zones</b>	3 Zones	
<b>Open Combustion</b>	Yes	
<b>Gas Service</b>	In use	
<b>Appliances 13+ years old</b>	Refrigerator	

## Blower Door Infiltration Test

This test measures and identifies the air leaks that allow air to flow into and out of the home. Air is constantly moving into and out of homes through natural processes called *infiltration* and *exfiltration*.

In most homes, hidden leaks around the chimneys, pipe chases, and structural connections to the attic and basement account for more loss of conditioned air than leaks at the windows and doors. During heating and cooling seasons, this constant flow of air significantly affects the home's energy performance and comfort since air which has already been conditioned is continually lost through these leaks. Then, additional energy must be used to condition the replacement air that flows in from the outside.

The Blower Door Test calculates a standardized measurement of **air change rate** in Air Changes per Hour (ACH). In addition, the **major leaks** are identified – the specific gaps, holes, seams and cracks that need to be sealed for improved energy performance. For many homes, air sealing these hidden leaks is the most effective single step to eliminate energy losses and improve comfort while reducing energy bills.

### Definitions

- **Air Changes per Hour (ACH)** measures the number of times all the air in a house turns over per hour. The recommended industry target for an air tight new home is 0.33 ACH in normal conditions, or one full air change every three hours.

In a leaky house with a 1.0 ACH rate, on a “normal” day, all the air is replaced with outside air (which needs to be reconditioned) once every hour. By lowering the ACH rate with air sealing, a house becomes easier to heat and cool, and is also much more comfortable.

- **Flow Rate** is measured in **Cubic Feet per Minute (CFM)**, and represents the volume of air that flows into the house at the industry standard 50 pascals of pressure used for the Blower Door Test.

- **Equivalent Leak Area (ELA)** is the total area of all holes, cracks, gaps, and vent openings that allow air to both infiltrate and escape from your house. In leaky houses, this area can be 5 to 10 square feet or more, equivalent to missing an entire window. These holes and gaps are the target of the air sealing process.

- **Infiltration/Exfiltration** is the air that moves naturally into or out of a house. At any moment, the air flowing in is approximately equal to the air flowing out. Cold and windy winter days produce the greatest air flows and highest energy costs, as the heating system can run constantly without ever making the home comfortable.

## Healthy Homes

The construction of most homes, even those built in recent years, allows large quantities of outside air to flow into the house. In addition to increasing energy use and decreasing comfort, leaky homes contribute to several interrelated problems. Infiltrating air can have a high moisture content leading to mildew and other moisture issues, and/or can contain high levels of allergens or pollutants. Uncontrolled air leaks actually contribute to poor indoor air quality.

After performing whole-house air sealing, many homeowners find that their home is more comfortable, even though they are using the heating and cooling system less. With a less drafty house, it is even possible to be more comfortable while setting back the thermostat by two to three degrees. And, each degree of setback can represent up to an 8% saving on energy costs during peak conditioning months.

Can your home be “too tight?” Yes, but this is a far less common condition than being too leaky. Few older homes can achieve this condition. If the Blower Door Infiltration Test indicates an ACH in the 0.5 range or less, we will then recommend appropriate mechanical fresh air ventilation strategies. An air tight house with high-efficiency, closed-combustion equipment and effectively controlled ventilation provides year-round comfort with low energy use and healthy indoor air quality.

## General Blower Door Test Guidelines

Air Change per Hour rate @ NORMAL	Your home's air leakage is	All air in home changes every	Recommendations
Below 0.33	very low	3 hours or more	Perform safety test on combustion equipment. Install additional mechanical ventilation. Focus air sealing on select areas.
0.33 to 0.49	low	2 to 3 hours	
0.50 to 0.7	moderate	1.5 to 2 hours	Perform whole-house air sealing. Perform safety test on combustion equipment after air sealing is completed.
0.71 to 0.9	high	1.5 to 1 hour	
Above 0.9	very high	1 hour or less	

## Your Test Results

Air Change per Hour rate @ NORMAL	Volume	Air Change per Hour rate @ 50 PA	Flow Rate	Equivalent Leakage Area
0.51 ACH moderate	59,000 cu. ft.	6.25 ACH	6405 CFM	822 sq. in.

### Leaks were noted in the following locations, listed from the basement to the attic:

#### Basement

Band joist

Hard ducts

Service penetrations

Exterior door

Crawl Space

#### Living Space

Electrical outlets and switches

Registers: supply, and return; both 2<sup>nd</sup> floor systems

Exterior door: front, living room, laundry room to garage, basement

Fireplace damper: family room, living room,

Baseboards: 2<sup>nd</sup> floor

Wall top plates: west bedroom and master bedroom

Exhaust fan: laundry powder room, living room powder room, master bath, 2<sup>nd</sup> floor bathrooms

#### Upper Areas

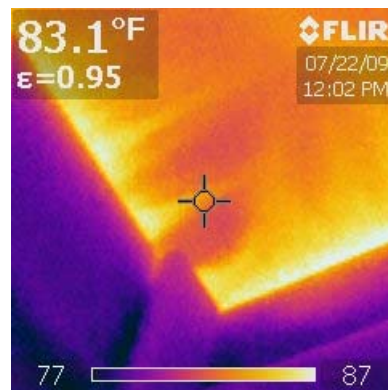
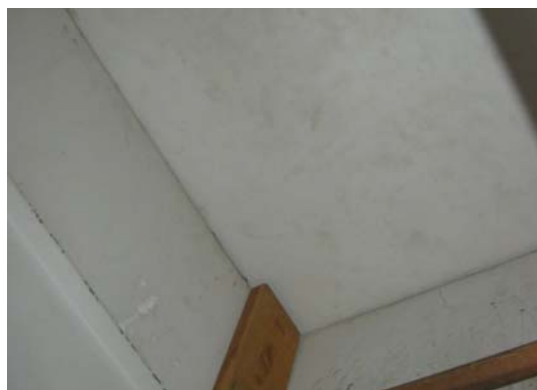
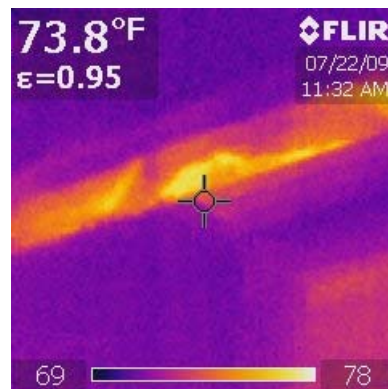
Recessed light fixtures: 2<sup>nd</sup> floor,

Attic access hatch

### 3) Seal All Air Leaks

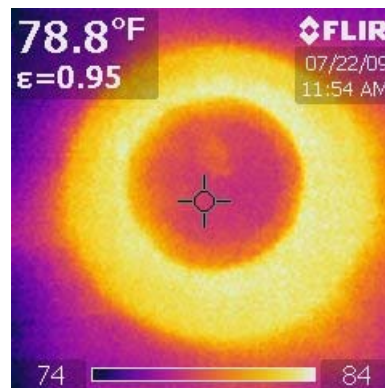
The Blower Door Infiltration Test calculates a standard measurement of the air leakage in your home. If your home's Air Change per Hour (ACH) rate indicates that air sealing is warranted, sealing these air leaks is the one of the most cost-effective steps to reduce energy bills while improving comfort and indoor air quality.

You home's ACH rate @ NORMAL	Your home's air leakage is	Main leakage areas	Recommendations
0.51	moderate	Band joist (photo and IR image below) Recessed light fixtures Crawlspace Attic access (second photo and IR image below)	Perform whole-house air sealing focusing on the main leakage areas.



## Additional Concerns and Recommendations

Observations	Recommendations
The home has open combustion equipment.	<p>Perform a Combustion Safety Test on combustion equipment after improvements to the building envelope are completed. The test will check the chimney draft, efficiency, and carbon monoxide levels of the equipment.</p> <p>This test meets the Building Performance Institute (BPI) standards and is performed under the control of a certified BPI professional.</p>
The band joist is insulated with fiberglass but not air sealed.	Remove the fiberglass batt to make the band joist accessible for foam air sealing.
The recessed lights on the second floor are a significant source of leakage in the house (photo and IR image below).	Install "IC Airtite" replacement reflector inserts from below on the ceiling side. These inserts are specifically designed to reduce heat loss and air leakage. Caulk the edge of the fixtures where they meet the ceiling.
The dampers on the fireplaces are not sealing tightly.	Repair or replace the fireplace dampers to provide full closure and a tight seal. Alternatively, install inflatable "chimney balloons" to seal the flues when not in use.
The exhaust fan dampers are not sealing properly (photo and IR image on following page). Several of the exhaust fans do not have dampers	Install tight sealing dampers on the outside end of each exhaust fan duct to prevent exterior air from flowing back into the house. Alternatively, replace existing exhaust fans in most used bathrooms with more efficient, tightly sealed models like the Panasonic Whisper Green.
Significant air leaks were observed around the finish trim, especially in the master bedroom closets.	Caulk and seal around edges of all finish trim, especially on the inside trim on the master bedroom closets and on any crown molding.
<p><b>DIY</b> Air leaks were noted at the switch plates, electrical outlets</p>	Install foam gaskets to seal these air leaks. They are inexpensive and easy to install. See <b>Quick and Easy Energy Savers</b> in the <a href="#">Improving Home Performance Guidebook</a> to order these items.





## 4) Insulate from Top to Bottom

Properly insulating a home requires selection of the right materials and proper installation to achieve maximum R-values. Understanding the impact of air sealing and moisture barriers on insulation is also critically important to proper building performance.

Follow these recommendations to obtain the best results.

Area	Current Insulation Type	Current R value	Recommended Upgrade	Recommended R value
Attic	Fiberglass batt	R 36	No upgrade recommended.	
Exterior Walls	Fiberglass batt	R 20	No upgrade recommended.	
Exterior Walls in master suite closets	Inconsistent fiberglass batt	unknown	Install additional cellulose insulation through a drill and plug process to fill voids in the existing insulation in this area.	R 15
Basement Walls	none	R 0	Use either vinyl-faced fiberglass blankets or rigid board. Eliminate all moisture in the basement before installing new insulation.  Alternatively, an insulated, finished wall panel system can be installed.	R11 or R13, respectively
Crawlspace Areas	none	R 0	Make the crawlspace areas part of the conditioned space by sealing both the walls and floor with a vapor barrier and insulating the exterior walls with rigid board or foam.	R11 or R13, respectively

## 7) Improve Your Water Heater

The water heater is usually the second highest energy user after heating and cooling in a typical household. Ensure that your water heater is as efficient as possible by planning its replacement BEFORE it fails.

Refer to the **Install Alternative Energy Systems** section for opportunities to produce clean energy on site to satisfy your home's needs.

Water Heater	Observations	Recommendations
2007 State Select gas 74 gallon Low Efficiency	Orphaned Well maintained Oversized for its usage.	See the recommendations listed in the earlier section of this report, <b>Address the Orphaned Water Heater</b> .  A water heater's average life expectancy is 11-14 years. Plan to replace the water heater with a high efficiency, closed-combustion or power vented Energy Star model when the current unit reaches its life expectancy or sooner if required because of combustion safety issues.

### Additional Concerns and Recommendations

Observations	Recommendations
The water heater tank is insufficiently insulated.	To improve the efficiency of the current unit if not replaced, install an insulated jacket around the tank. For safety, this should be professionally installed.  Ensure that the insulated jacket does not cover the controls or the pressure relief valve. In addition, proper combustion requires a clear air space gap at the floor and surrounding the top hood vent.
There is a long distance between the basement water heater and the bathrooms on the upper floors.	Install an on-demand hot water circulator system to reduce water and energy losses due to waiting for hot water to be supplied to the bathroom.
<b>DIY</b> The water pipes leading both to and from the water heater are uninsulated.	To help conserve the heated water, insulate all accessible supply pipes with insulated pipe sleeves. To order pipe sleeves, refer to <b>Quick and Easy Energy Savers</b> in the <a href="#">Improving Home Performance Guidebook</a> .
<b>DIY</b> Water tanks benefit from regular flushing.	Flush the water heater tank once a year by connecting a hose to the lower clean-out bib and completely emptying the tank. This will remove any sediment that has collected in the tank and keep the water heater operating at its highest efficiency.