



**TERRALOGOS**  
ENERGY GROUP

# **TerraLogos Energy Efficiency Report**



**PREPARED FOR**

**Michael and Debbie Bloomfield**  
**1969 Electric Flag Way**  
**Edgewater, Maryland 21098**

**DATE OF ENERGY AUDIT**

**July 7, 2010**

**ENERGY AUDITOR**

**Justin Iovenitti**

**Abridged from a 28-page Report**

**TERRALOGOS ENERGY GROUP**

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## Property Information

<b>Owner</b>	Michael and Debbie Bloomfield		
<b>Location</b>	1969 Electric Flag Way Edgewater, Maryland 21098		
<b>Phone Number</b>	443-533-17851		
<b>Date of Energy Audit</b>	July 7, 2010		
<b>Energy Auditor</b>	Justin Iovenitti		
<b>Year Built</b>	2002 Owner since 2009		
<b>Type and Exterior</b>	Detached, vinyl clapboard siding		
<b>Exposure</b>	<p>The front of the house faces southwest with solar exposure on the southeast, southwest and northwest sides. The house is protected from north winds.</p> <p>The roof and exposure are well-suited for the installation of a solar thermal or photovoltaic system.</p>		
<b>Building Size</b>	39' x 33' overall - 2 stories plus basement, including garage 12' x 10' - 1 story plus basement		
<b>Conditioned Space</b>	Area: 3,000 sq. ft.	Volume: 24,000 cu. ft.	
<b>Garage</b>	Attached, conditioned space above		
<b>Basement</b>	Primarily finished and conditioned		
<b>Attic</b>	Unfinished and unconditioned		
<b>Roof</b>	Pitched, dark-colored composite shingles		
<b>Windows</b>	Approximately 28, mainly double-glazed double hung vinyl		
<b>Thermostats</b>	2 programmable	<b>Zones</b>	1 <sup>st</sup> floor & basement/2 <sup>nd</sup> floor
<b>Open Combustion</b>	None		
<b>Gas Service</b>	Unavailable		
<b>Appliances</b> 14+ years old	None		



## Audit Photos

Many of the photos from your energy audit are included in this Report to identify specific issues. Use the link below to access all the photos, both regular and infrared, that were taken by your auditor.

[Click to view all audit photos](#)

# Health and Safety

## 1) Control Moisture

Controlling moisture issues is a primary concern since they adversely affect energy use, comfort, indoor air quality and the structure of the home. Always eliminate any moisture issues before performing air sealing and installing insulation.

Moisture Issue	Recommendations
One of the bathroom exhaust fans vents into the basement. This can cause moisture problems and encourage microorganism growth.	Configure the ducts for all exhaust fans so that air is directed outside of the house to prevent moisture condensation and growth.
The house has a below grade basement. Our humid Maryland summers create a high moisture load in below ground areas. This can cause moisture issues, particularly when the home is air sealed.	Use the existing dehumidifier to control dampness during the summer months.



## 2) Improve Indoor Air Quality

Since your home is already fairly airtight, it is well on its way to being energy efficient. However, installing controlled ventilation is recommended to maintain healthy indoor air quality in an air tight home. Properly installed, controlled ventilation systems can also eliminate drafts.

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
0.37 ACH low	24,000 cu. ft.	5.5 ACH	2,210 CFM	225 sq. in.

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

### Basement

Band joist  
Service penetrations

### Living Space

Electrical outlets and switches  
\* Registers: 2<sup>nd</sup> floor supply and return  
\* Wall top plates  
\* Exhaust fan: master bath, 2<sup>nd</sup> floor bath  
Sink pipe penetrations: 2<sup>nd</sup> floor bath

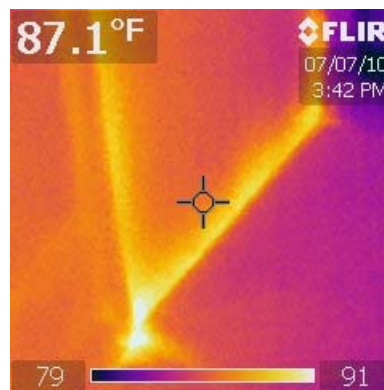
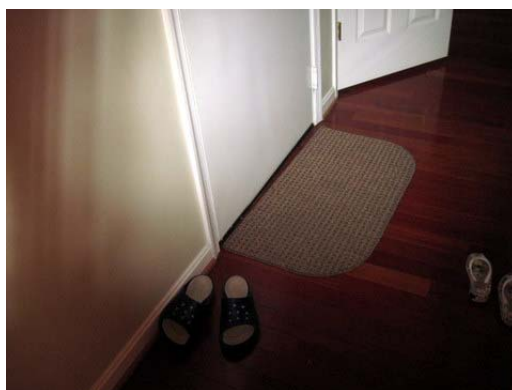
### Upper Areas

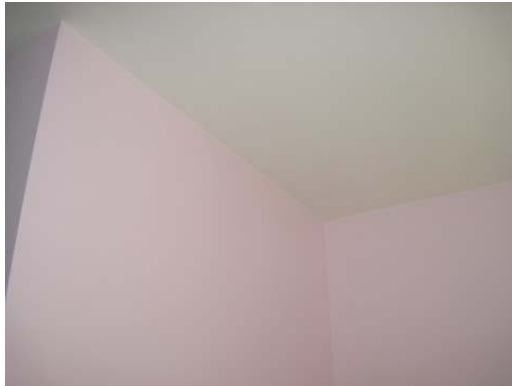
\* Recessed light fixtures: master bath  
\* Ceiling fixtures: fans, lights  
\* Knee wall access door: master bedroom closet  
\* Attic drop-down stair

### 3) Seal Air Leaks with Targeted Air Sealing

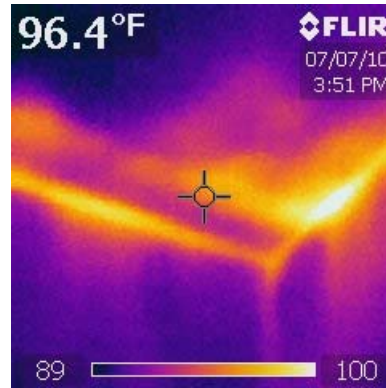
The Blower Door Infiltration Test indicates that air sealing is warranted. When properly performed by a qualified contractor, air sealing is always one of the most cost-effective energy improvement projects. Air sealing reduces energy bills in all seasons while improving comfort and indoor air quality.

Observations	Recommendations
Air leakage is a source of energy loss for the home.	Perform 2 hours of targeted air sealing focusing on these major air leak areas:  Attic floor, recessed and ceiling fixtures (photo follows), drop down attic stair (photo follows), knee wall access
There is air leakage around the door to the garage (photo follows).	Install weather stripping on the garage door.
The band joist is insulated with exposed fiberglass but not air sealed.	Remove the exposed fiberglass insulation at the basement band joist to perform air sealing. Seal all cracks at the band joist with foam, and then replace or add new fiberglass batt insulation to R19.  Alternatively, remove the fiberglass batt, and fill the cavity with 5" (R19) of open cell foam.
The unsealed wall top plates in the attic floor are a significant source of air leakage (photo follows).	Seal wall top plates at the attic floor. Complete this air sealing before adding any additional insulation in the attic.

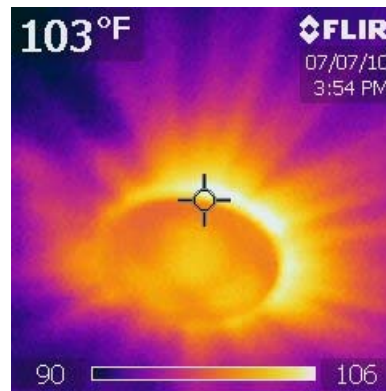
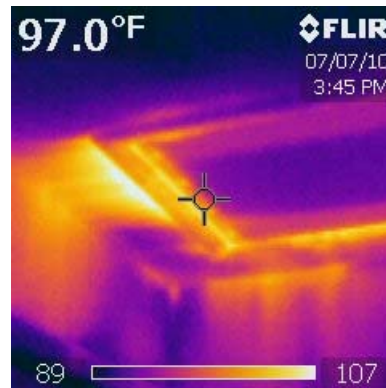




Wall top plate leakage



Wall top plate leakage



#### 4) Insulate from Top to Bottom

Properly insulating a home requires selection of the right materials and proper installation to achieve recommended 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.

## Upgrade Equipment

### 5) Improve Your Heating, Ventilation & Air Conditioning (HVAC)

If practical, complete the recommendations in the **Fix Energy Leaks** section of this report before replacing or installing new mechanical systems. By fixing the energy leaks first, smaller less expensive systems will be able to satisfy most of the home’s needs.

Work with a qualified mechanical contractor, using a Manual J calculation, to properly size the unit. After air sealing and insulation upgrades have been completed, it may be possible to downsize the system.

“Right sizing” equipment saves energy, as a properly sized system runs at the highest level of efficiency. In addition, smaller systems often cost less to purchase. We strongly recommend switching to clean renewable energy sources if practical. Alternatively, upgrade to high efficiency, closed combustion systems to improve health and reduce energy costs.

Federal, state and local tax incentives are available that can substantially reduce the installation costs of alternative energy systems.

The goal is an energy efficient home that satisfies most of its energy needs from on-site renewable sources. Then, you will have the lowest energy bills and least environmental impact while providing a comfortable, healthy home for your family.

System	Observations	Recommendations
Heating/Cooling: Heat Pump, Two units  2002  Trane  2 Tons  10 SEER	Not highly efficient, but still has significant serviceable life.  The site has sufficient space for drilling the wells required for installing a geothermal heating & cooling system.	No equipment upgrades are recommended at this time.  The average life expectancy for heat pumps is 15 years. Plan to replace with either a geothermal heating & cooling system or a high efficiency, Energy Star model when the current unit reaches its life expectancy.

### Additional Concerns and Recommendations

Observations	Recommendations
The heat pumps use electric resistance auxiliary heat in the coldest parts of the winter. Electric resistance heat is the most expensive method for conditioning a home.	Consider replacing the existing air handlers with high-efficiency LP gas furnaces. The existing interior coils and outdoor condensers for cooling would not need to be replaced. The existing air source heat pumps and the new furnaces would work together to deliver heat at the highest efficiencies from the beginning to the end of the heating season. The furnaces would begin operating at temperatures around 40 degrees and below.
The home’s configuration is well-suited to the installation of a whole-house fan.	Create an alternative to air conditioning by installing a whole house fan in the floor of the attic at a central location.

## Maintenance

Observations	Recommendations
A regular schedule for cleaning and maintenance has not been established.	Continue to perform service maintenance on the HVAC system and maintain an annual service contract to keep it operating at its best efficiency.
The air filters need to be replaced regularly.	Replace or clean air filters on all units regularly, at a minimum every 3 months they are in use. Clean filters allow air to flow easily improving the comfort and reducing costs.



## Advantages of Geothermal Heating & Cooling Systems

A geothermal heating and cooling system provides conditioning for homes by pumping heat from or to the ground. Sometimes called a **ground source heat pump (GSHP)**, it uses the earth as a heat source (in the winter) or a heat sink (in the summer). This design takes advantage of the moderate temperatures in the ground to boost efficiency and reduce the operational costs for heating and cooling systems. A geothermal system can satisfy almost all a home's heating and cooling needs, along with much of the home's domestic hot water, using clean renewable energy.

Like a refrigerator or air conditioner, these systems use a heat pump to transfer heat from a cool space to a warm space. All heat pumps are more efficient at heating than pure electric heaters, even in winter. However, a geothermal heat pump exchanges heat with the ground, whereas, a conventional heat pump system exchanges heat with the air. Since underground temperatures are more stable than air temperatures, a geothermal system is even more energy-efficient than a conventional heat pump in both winter and summer.

A geothermal system will result in heating efficiencies 50 to 70% higher and cooling efficiencies 20 to 40% higher than other systems. Here is a simple [geothermal savings](#)