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## Your Home



Nancy Wilson

3413 Glenn Drive

301 883 7312

[nmwilson@co.pg.md.us](mailto:nmwilson@co.pg.md.us)

Single-Family Detached

Built in 1945



Square Footage: 1076.00 sq.ft.

Area: 7858.00 cu.ft

Heating System: Oil

Hot Water: Electricity



Date of Audit: 08/30/12

Company: Energy Services Group - Central Maryland

Energy Auditor: James Otterbacher

Contact Email: [jamesotter99@yahoo.com](mailto:jamesotter99@yahoo.com)

Contact Phone Number: 443-618-3399 /Mob:

## Your Home Energy Scores

You called our Energy Services Group - Central Maryland Energy Detectives to help increase the comfort in your home and to reduce your energy usage. Areas that you were particularly concerned about are: .

After a thorough inspection of your home we created your Home Energy Scorecard. It uses a simple scoring system to help you understand which areas of your home performed well and in which areas cost-effective improvements can be made.

Section Name	Top Score	Audit Score
Air Exchange	5	1
Appliances & Lighting	5	3
Attic	5	1
Fenestration	5	2
HVAC	5	2
Insulation	5	1
Energy Management	5	4
Water Heating & Conservation	5	3
Health & Safety	5	1
<b>Total</b>	<b>45</b>	<b>18</b>

### Summary of Findings:

#### Health and Safety concerns:

- Loose or partly missing siding, Poor condition of flashing, Poor condition of roof, Disconnected downspout, Other, No or not sufficient CO detectors installed, No or not sufficient smoke alarms installed, Signs of moisture in crawl space

#### Comfort and Energy problems:

- Unsealed top plates (top of wall cavities connecting to attic), Leaky attic access hatch, Gaps in attic floor around pipe, Open chase connects living space to attic, Leaky rim / band joists, Leakage through electric wire / plumbing / refrigerant line penetrations in building structure, Leakage from unfinished walls, Unconditioned air from eaves / knee wall attics enters living space, Leakage from unsealed top plates, Leakage from light fixtures / fan connected to ceiling
- Inefficient household appliances, Inefficient refrigerator / freezer, Inefficient light bulbs in some areas
- Areas of missing insulation in attic, Insufficient insulation in inaccessible attic, Low insulation level in knee wall attics, Insufficient insulation and air sealing at knee walls, Clogged soffit vents, Insufficient ventilation in attic
- Broken or cracked window, Leaky exterior access door
- Inefficient window A/C units, Other, Leaky ductwork, Inefficient layout of duct system, Other
- No insulation in exterior walls, Insufficient insulation in floor over unconditioned space, Insufficient insulation level in crawl space, Insufficient insulation in sloped ceiling, No air-barrier over top of exposed insulation

- Manual thermostat
- Standard flow faucets, Standard flow shower heads, Water pipes need to be insulated, Water heater is approaching its useful life expectancy



# Energy Efficiency Improvement Recommendations

In a cost-effective priority-ranked order

Rank	Section
1	<b>Health &amp; Safety</b> Repair siding Repair flashing Repair roof Renew roof Install downspout Install CO detector Install smoke alarms Install a vapor barrier in crawl space and seal all pathways to living space
2	<b>Air Exchange</b> Air-seal all top plates Air-seal and insulate attic access hatch Seal gaps at pipe penetration Seal open chase ways Air-seal and insulate rim / band joists Spray foam gaps at building envelope penetrations Seal leaks at unfinished wall Remove knee wall attic from living space Bring knee wall attic into living space Seal all top plates in attic Seal at fixtures connected to ceiling in upper level
3	<b>Attic</b> Add insulation where missing in attic Gain access to sealed attic and add insulation Insulate knee wall attic Air-seal and insulate knee walls in attic Clear soffit vents and install vent baffles Install additional ventilation to attic
4	<b>Insulation</b> Add insulation to exterior walls Insulate floor over unconditioned space Air-seal and insulate crawl space Fill sloped ceiling with insulation Install air barrier over exposed insulation
5	<b>Fenestration</b> Install a storm window Adjust hinges and strike plate of door Weather-strip exterior door and install door sweep Install a storm door

<p><b>6</b></p>	<p><b>HVAC</b>          Replace old window A/C units          Install a central A/C system to replace use of window units          Air-seal ducts in unconditioned space          Perform internal duct sealing          Re-lay flex ducts in attic to improve efficiency</p>
<p><b>7</b></p>	<p><b>Appliances &amp; Lighting</b>          Replace major household appliances          Replace refrigerator with an Energy Star rated unit          Replace old light bulbs with energy efficient bulbs</p>
<p><b>8</b></p>	<p><b>Water Heating &amp; Conservation</b>          Install low-flow aerators at faucets          Install low-flow shower heads          Insulate hot water pipes          Insulate water pipes          Regularly service the water heater until it needs to be replaced</p>
<p><b>9</b></p>	<p><b>Energy Management</b>          Install programmable thermostats</p>

**Please see report below for detailed problems and solutions.  
 View end of the report for contractor recommendations.**

## Improve your score



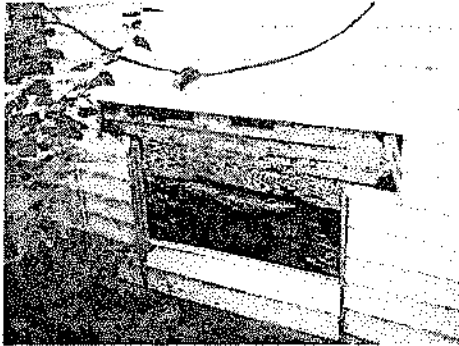
**Area of Focus: Health & Safety**  
**Your Score: 1 out of 5**

Helping you save energy is the main goal of our inspection. But even more important to us is to make sure that your home is a safe and healthy place for you and your family. Therefore we tested your gas pipes for leaks, checked your combustion appliances for efficiency and carbon monoxide (CO) production, and monitored the ambient CO throughout the home. We also searched for signs of moisture in order to eliminate sources of water leakage before they can turn into unhealthy forms of mold. If we detected any potentially dangerous construction flaws, we also make note of them in this section. For your safety and health, it is highly recommended that you solve all problems of this section before you proceed with air sealing and insulating your home. Areas where your score needs to be improved are:

**Problem: Loose or partly missing siding**

Location: Exterior of the home

**Solution:** We recommend re-installing or repairing the siding to prevent water damage and excessive wind infiltration to the house.



**Problem: Poor condition of flashing**

Location: Exterior

**Solution:** The flashing that protects wooden roof parts from rotting is in bad shape and possibly allowing water infiltration. We recommend having this repaired by a qualified contractor.

**Problem: Poor condition of roof**

Location: Roof Sections

**Solution:** We recommend that you contact a roofing qualified contractor to repair the roof.

**Solution:** Regarding the age and condition of your roof, installing a new roof might be cost-effective. Please contact qualified roofing companies for estimates.

**Problem: Disconnected downspout**

Location: Exterior

**Solution:** We recommend that you install a downspout to direct all water away from the foundation.



**Problem: Other**

Location: Gutters

While doing my inspection I noticed some sections of the gutters were damaged or missing completely. After the new roof has been installed make sure to put up new gutters around the home.

**Solution:** Please see specifications in auditor's note.



**Problem: No or not sufficient CO detectors installed**

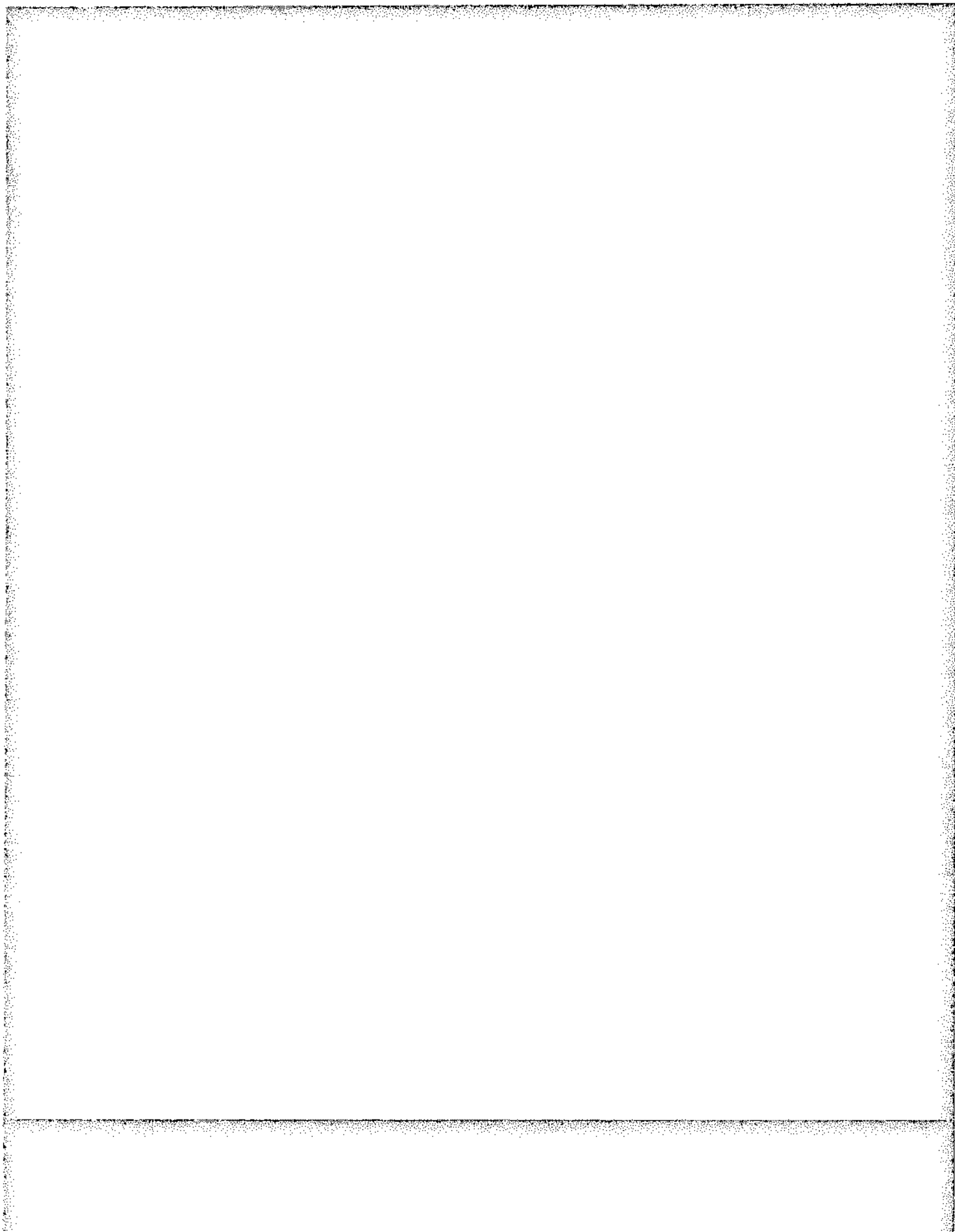
Location:

**Solution:** Install at least one CO detector close near your bedroom or other area where you spend the most time. Ideally place another one near the combustion appliances and additional detectors on every other floor. Installed CO detectors should be hardwired with a battery back-up. Plug-in detectors alone are not sufficient.

**Problem: No or not sufficient smoke alarms installed**

Location:

**Solution:** Ensure that smoke detectors are installed in all bedrooms and in other areas of the home so that there is a minimum of one per floor (including basement).



**Problem: Signs of moisture in crawl space**

Location: Main Crawlspace

**Solution:** Install a vapor barrier on the ground and fix drainage problems around the foundation to prevent further moisture from entering. Make sure all pathways up (wall cavities and chimneys) are properly sealed to prevent moisture from traveling up and condense in the walls.

**Area of Focus: Air Exchange**  
**Your Score: 1 out of 5**

Air exchange is a key component to the energy efficiency of a home, as uncontrolled air exchange is one of the largest contributors to high utility bills. During your Diagnostic Home Energy Audit we measured the exact amount of your home's air leakage utilizing a Blower Door test. Then we pinpointed the locations of costly energy leaks and documented them for you below. Based on the volume ( 7858.00 cubic feet) and layout of your home ( 2 stories above ground) the ideal air exchange within your home should be around 757.00 CFM50. Your home reported 4685.00 CFM50. This means that your home is exchanging 6.189 times as much air with the outside every hour than the recommended amount. Therefore you have a very large opportunity to increase efficiency as far as air leakage is concerned. We recommend that air sealing be implemented in the following locations where air infiltration is occurring:

**Problem: Unsealed top plates (top of wall cavities connecting to attic)**

Location: Attics

**Solution:** Expose and air-seal all accessible top plates from attic location with spray foam, including exterior walls. Be careful not to close off soffit ventilation, if existing. Spread out insulation evenly after completing this job.

**Problem: Leaky attic access hatch**

Location: Kneewall Attic Entrances

**Solution:** Glue rigid foam board to back side of attic hatch and weather-strip the perimeter to block air leakage. You can also install latches to tightly hold the hatch in place.

**Problem: Gaps in attic floor around pipe**

Location: Attics

**Solution:** Spray-foam entire gap to close the pathway for air exchange.

**Problem: Open chase connects living space to attic**

Location: Crawlspace

**Solution:** Use rigid foam board and spray-foam to seal all openings where the chaseway meets the attic floor. Also seal the chase way opening to the basement.

**Problem: Leaky rim / band joists**

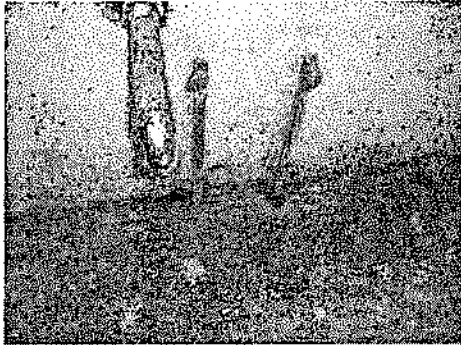
Location: Crawlspace

**Solution:** Seal around the perimeter of each section of rim joist at its connection to the sill plate, floor joists, and subfloor with spray foam. If the sill plate is not flush with the foundation wall, also seal gaps between the sill plate and the foundation wall with spray foam. After air sealing, insulate the rim joist to a minimum of R-13 with fiberglass and/or rigid foam board insulation.

**Problem: Leakage through electric wire / plumbing / refrigerant line penetrations in building structure**

Location: Crawlspace

**Solution:** Spray foam or caulk penetrations from all accessible interior locations. Additionally, use weather-resistant putty to seal hole from the outside.



**Problem: Leakage from unfinished walls**

Location: Bathroom

**Solution:** Seal all airways that are located at the unfinished part of the wall (sill plate, connection to neighboring house, exterior penetrations, wall cavities) and add insulation to the exterior walls. If needed, close the wall cavity to the sides. Ideally, finish the walls with a continuous layer of dry wall to completely stop airflow into your living space.



**Problem: Unconditioned air from eaves / knee wall attics enters living space**

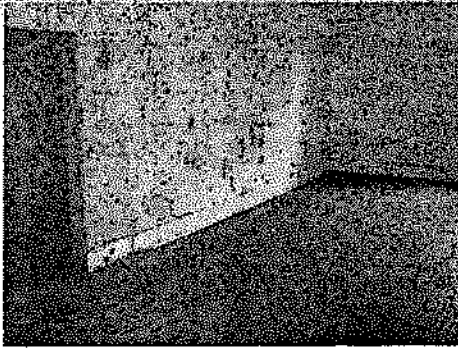
Location: Kneewall Attics

Depending on whether you want to keep the kneewall areas for storage or not is the determining factor on bringing the kneewalls into the living space or keep them outside.

**Solution:** (Remove knee wall space from living space) Ensure proper insulation in sloped ceiling cavity adjacent to the living space. Spray foam all knee wall connections and ensure that the floor cavity of the living space is blocked off from the kneewall attic space and air sealed. Install batt, spray foam, or rigid board insulation to the face of the knee wall to achieve an R-value of at least 13 and cover with a continuous air barrier. Air seal all bypasses in the kneewall attic floor that connect the attic space to the living space below and then add insulation to the floor of the kneewall attic to achieve an R-value of at least 38. Insulate the access hatch with rigid foam board and weather-strip the perimeter.

**Solution:** (Bring knee wall space into living space) Foam soffit vent baffles into place and extend them all the way to the top attic to ensure ventilation to that attic space. Add insulation to the roof joist cavity of the kneewall attic to achieve an R-value of at least 30. Cover the joist cavity with a rigid material such as foam board or drywall and seal all connections along the entire

sloped ceiling cavity with spray foam, caulk/ or spackle to ensure that the sloped ceiling cavity and soffit vents are completely sealed off from the kneewall attic space.



**Problem: Leakage from unsealed top plates**

Location: Attic

**Solution:** Seal top plates from attic location.

**Problem: Leakage from light fixtures / fan connected to ceiling**

Location: Attic

**Solution:** Caulk or spray-foam all penetrations from attic location. Caulk around the perimeter of the fixture from room location.

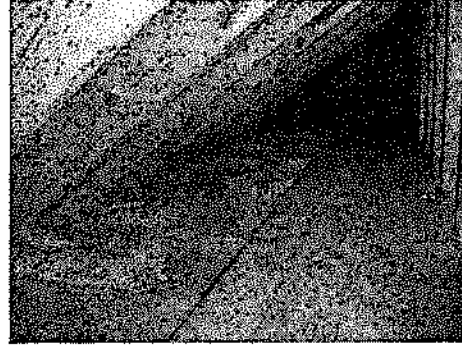
**Area of Focus: Attic**  
**Your Score: 1 out of 5**

Since heat rises and the attic is on the top of your home's building envelope, it remains one of the most important areas for your home's energy profile. The attic's condition is a deciding factor in whether your home's thermal envelope is properly sealed. If accessible, we provide a detailed inspection of your attic space including exposed ductwork identifying problematic areas that may be adding significantly to your monthly energy bills. Areas where your attic score could improve are:

**Problem: Areas of missing insulation in attic**

Location: Attic Area

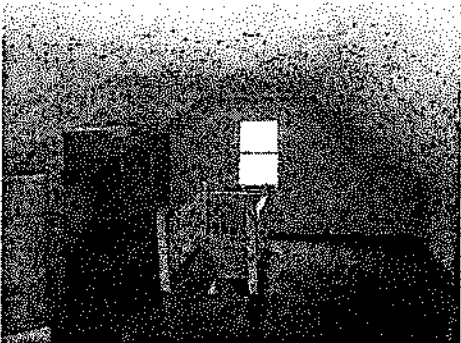
**Solution:** Even small areas of the the attic floor that are missing insulation can greatly reduce the overall insulation value of the attic floor. We recommend adding a minimum of 14 inches of blown-in cellulose to these areas to bring the insulation value to the recommended level for this climate (R-38 to R-60).



**Problem: Insufficient insulation in inaccessible attic**

Location: Main Peak Attic

**Solution:** During the inspection we found signs that the attic that is inaccessible does not have sufficient insulation to keep the rooms underneath at a comfortable temperature. In order to repair this problem, access will need to be cut through existing drywall either from underneath or from an adjoining knee wall. Then cellulose insulation can be blown in to achieve an R-value of 49.



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# Energy Efficiency Improvement Recommendations

In a cost-effective priority-  
ranked order

Rank	Section
<p><b>1</b></p>	<p><b>Health &amp; Safety</b>            Repair siding            Repair flashing            Repair roof            Renew roof            Install downspout            Install CO detector            Install smoke alarms            Install a vapor barrier in crawl space and seal all pathways to living space</p>
<p><b>2</b></p>	<p><b>Air Exchange</b>            Air-seal all top plates            Air-seal and insulate attic access hatch            Seal gaps at pipe penetration            Seal open chase ways            Air-seal and insulate rim / band joists            Spray foam gaps at building envelope penetrations            Seal leaks at unfinished wall            Remove knee wall attic from living space            Bring knee wall attic into living space            Seal all top plates in attic            Seal at fixtures connected to ceiling in upper level</p>
<p><b>3</b></p>	<p><b>Attic</b>            Add insulation where missing in attic            Gain access to sealed attic and add insulation            Insulate knee wall attic            Air-seal and insulate knee walls in attic            Clear soffit vents and install vent baffles            Install additional ventilation to attic</p>
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<p><b>5</b></p>	<p><b>Fenestration</b>            Install a storm window            Adjust hinges and strike plate of door            Weather-strip exterior door and install door sweep            Install a storm door</p>

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**Please see report below for detailed problems and solutions.  
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## Improve your score



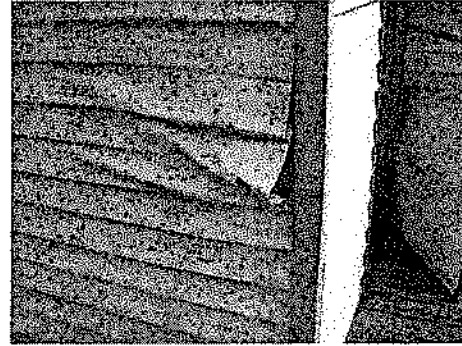
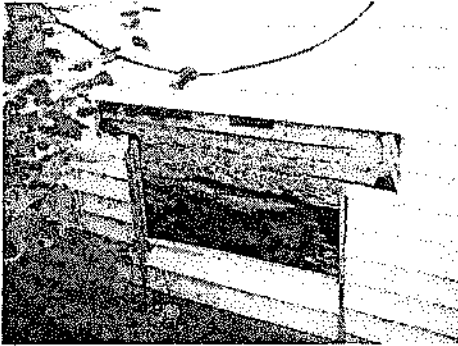
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Location: Exterior of the home

**Solution:** We recommend re-installing or repairing the siding to prevent water damage and excessive wind infiltration to the house.



**Problem: Poor condition of flashing**

Location: Exterior

**Solution:** The flashing that protects wooden roof parts from rotting is in bad shape and possibly allowing water infiltration. We recommend having this repaired by a qualified contractor.

**Problem: Poor condition of roof**

Location: Roof Sections

**Solution:** We recommend that you contact a roofing qualified contractor to repair the roof.

**Solution:** Regarding the age and condition of your roof, installing a new roof might be cost-effective. Please contact qualified roofing companies for estimates.

**Problem: Disconnected downspout**

Location: Exterior

**Solution:** We recommend that you install a downspout to direct all water away from the foundation.



**Problem: Other**

Location: Gutters

While doing my inspection I noticed some sections of the gutters were damaged or missing completely. After the new roof has been installed make sure to put up new gutters around the home.

**Solution:** Please see specifications in auditor's note.



**Problem: No or not sufficient CO detectors installed**

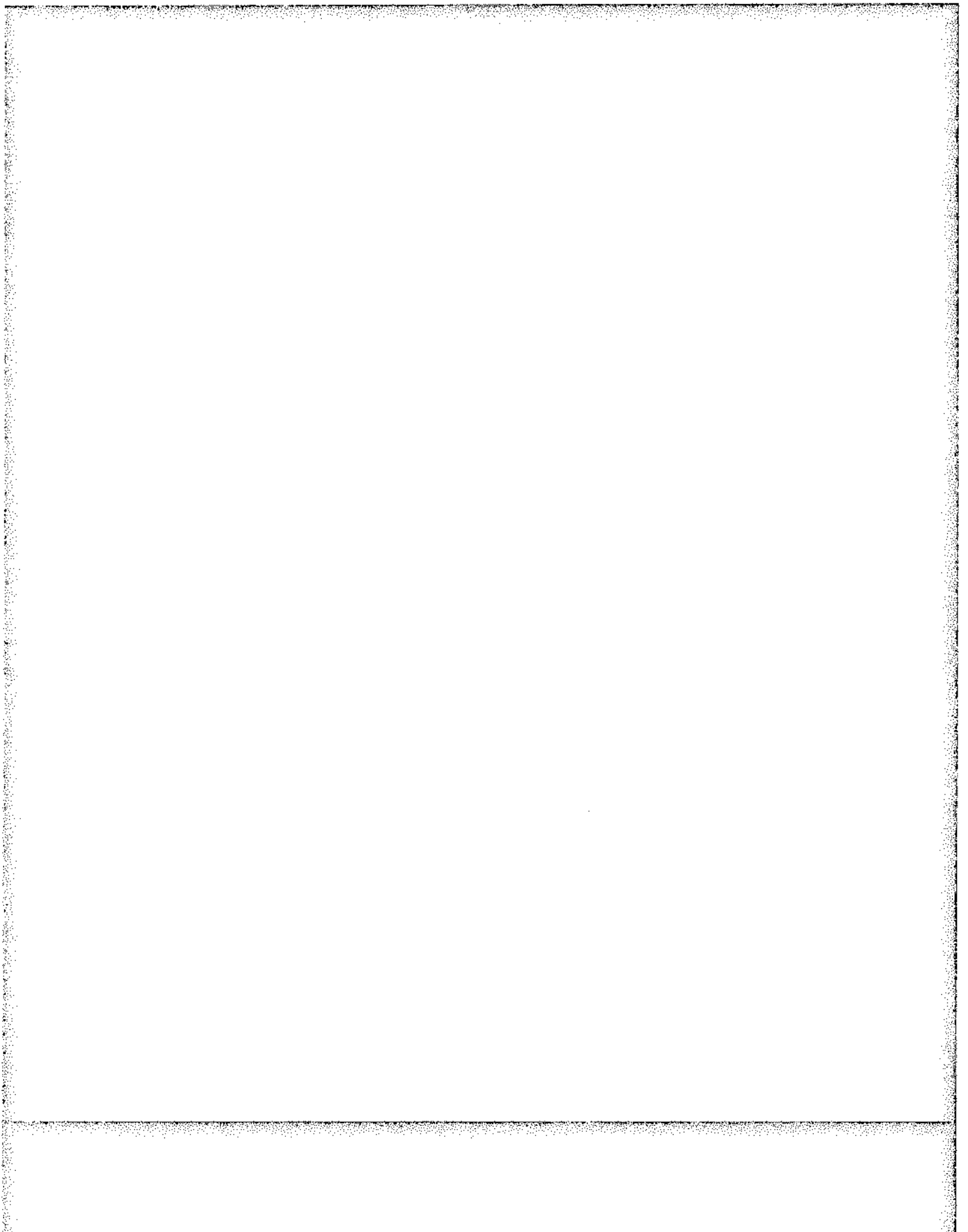
Location:

**Solution:** Install at least one CO detector close near your bedroom or other area where you spend the most time. Ideally place another one near the combustion appliances and additional detectors on every other floor. Installed CO detectors should be hardwired with a battery back-up. Plug-in detectors alone are not sufficient.

**Problem: No or not sufficient smoke alarms installed**

Location:

**Solution:** Ensure that smoke detectors are installed in all bedrooms and in other areas of the home so that there is a minimum of one per floor (including basement).



**Problem: Signs of moisture in crawl space**

Location: Main Crawlspace

**Solution:** Install a vapor barrier on the ground and fix drainage problems around the foundation to prevent further moisture from entering. Make sure all pathways up (wall cavities and chimneys) are properly sealed to prevent moisture from traveling up and condense in the walls.

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**Problem: Unsealed top plates (top of wall cavities connecting to attic)**

Location: Attics

**Solution:** Expose and air-seal all accessible top plates from attic location with spray foam, including exterior walls. Be careful not to close off soffit ventilation, if existing. Spread out insulation evenly after completing this job.

**Problem: Leaky attic access hatch**

Location: Kneewall Attic Entrances

**Solution:** Glue rigid foam board to back side of attic hatch and weather-strip the perimeter to block air leakage. You can also install latches to tightly hold the hatch in place.

**Problem: Gaps in attic floor around pipe**

Location: Attics

**Solution:** Spray-foam entire gap to close the pathway for air exchange.

**Problem: Open chase connects living space to attic**

Location: Crawlspace

**Solution:** Use rigid foam board and spray-foam to seal all openings where the chaseway meets the attic floor. Also seal the chase way opening to the basement.

**Problem: Leaky rim / band joists**

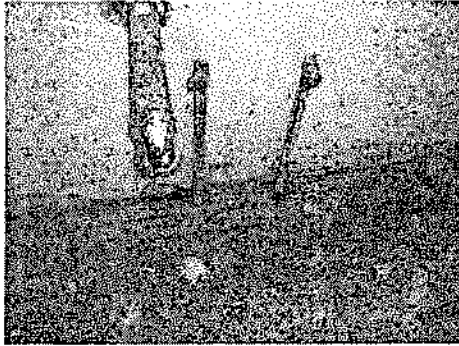
Location: Crawlspace

**Solution:** Seal around the perimeter of each section of rim joist at its connection to the sill plate, floor joists, and subfloor with spray foam. If the sill plate is not flush with the foundation wall, also seal gaps between the sill plate and the foundation wall with spray foam. After air sealing, insulate the rim joist to a minimum of R-13 with fiberglass and/or rigid foam board insulation.

**Problem: Leakage through electric wire / plumbing / refrigerant line penetrations in building structure**

Location: Crawlspace

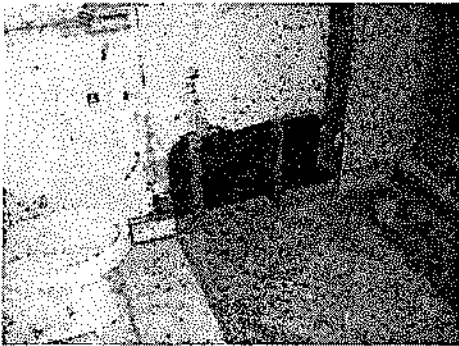
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**Problem: Leakage from unfinished walls**

Location: Bathroom

**Solution:** Seal all airways that are located at the unfinished part of the wall (sill plate, connection to neighboring house, exterior penetrations, wall cavities) and add insulation to the exterior walls. If needed, close the wall cavity to the sides. Ideally, finish the walls with a continuous layer of dry wall to completely stop airflow into your living space.



**Problem: Unconditioned air from eaves / knee wall attics enters living space**

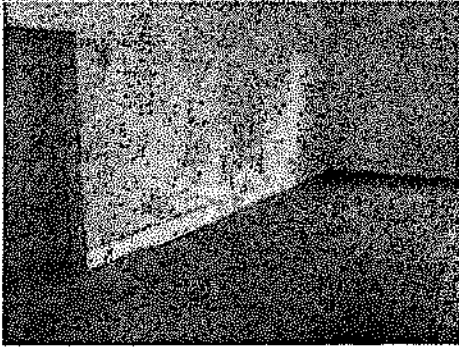
Location: Kneewall Attics

Depending on whether you want to keep the kneewall areas for storage or not is the determining factor on bringing the kneewalls into the living space or keep them outside.

**Solution:** (Remove knee wall space from living space) Ensure proper insulation in sloped ceiling cavity adjacent to the living space. Spray foam all knee wall connections and ensure that the floor cavity of the living space is blocked off from the kneewall attic space and air sealed. Install batt, spray foam, or rigid board insulation to the face of the knee wall to achieve an R-value of at least 13 and cover with a continuous air barrier. Air seal all bypasses in the kneewall attic floor that connect the attic space to the living space below and then add insulation to the floor of the kneewall attic to achieve an R-value of at least 38. Insulate the access hatch with rigid foam board and weather-strip the perimeter.

**Solution:** (Bring knee wall space into living space) Foam soffit vent baffles into place and extend them all the way to the top attic to ensure ventilation to that attic space. Add insulation to the roof joist cavity of the kneewall attic to achieve an R-value of at least 30. Cover the joist cavity with a rigid material such as foam board or drywall and seal all connections along the entire

sloped ceiling cavity with spray foam, caulk, or spackle to ensure that the sloped ceiling cavity and soffit vents are completely sealed off from the kneewall attic space.



**Problem: Leakage from unsealed top plates**

Location: Attic

**Solution:** Seal top plates from attic location.

**Problem: Leakage from light fixtures / fan connected to ceiling**

Location: Attic

**Solution:** Caulk or spray-foam all penetrations from attic location. Caulk around the perimeter of the fixture from room location.

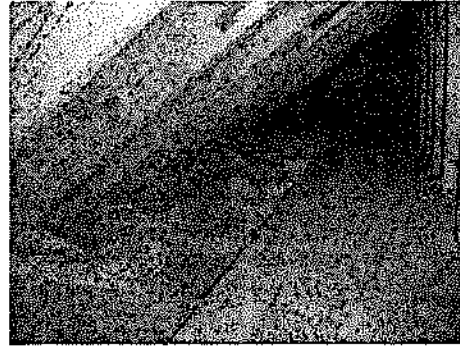
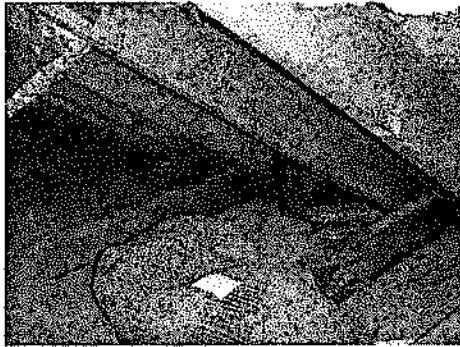
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**Problem: Areas of missing insulation in attic**

Location: Attic Area

**Solution:** Even small areas of the the attic floor that are missing insulation can greatly reduce the overall insulation value of the attic floor. We recommend adding a minimum of 14 inches of blown-in cellulose to these areas to bring the insulation value to the recommended level for this climate (R-38 to R-60).



**Problem: Insufficient insulation in inaccessible attic**

Location: Main Peak Attic

**Solution:** During the inspection we found signs that the attic that is inaccessible does not have sufficient insulation to keep the rooms underneath at a comfortable temperature. In order to repair this problem, access will need to be cut through existing drywall either from underneath or from an adjoining knee wall. Then cellulose insulation can be blown in to achieve an R-value of 49.



# **Your Home Energy Profile**

**by**

Energy Services Group - Central Maryland



Thank you very much for choosing us as your trusted home energy auditing company. We greatly appreciate your business and would like you to know that we are eager to help you lower the energy usage in your home and in turn lower the carbon footprint of our community.



Our services are certified through:

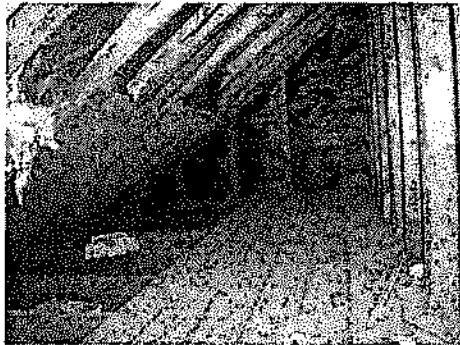
**Problem: Low insulation level in knee wall attics**

Location: 2nd floor kneewall Attic sections

Depending on how you want to use the kneewall attic decides the proper solution to apply. The ideal way is separate the kneewall attics from the living space. The other option is to install insulation into the roof rafters and then place a rigid foam board on the bottom that is seal in place. The 2nd option gives you the most storage area but less R-value.

**Solution:** (Remove knee wall space from living space) Ensure proper insulation in sloped ceiling cavity adjacent to the living space. Spray foam all knee wall connections and ensure that the floor cavity of the living space is blocked off from the kneewall attic space and air sealed. Install batt, spray foam, or rigid board insulation to the face of the knee wall to achieve an R-value of at least 13 and cover with a continuous air barrier. Air seal all bypasses in the kneewall attic floor that connect the attic space to the living space below and then add insulation to the floor of the kneewall attic to achieve an R-value of at least 38. Insulate the access hatch with rigid foam board and weather-strip the perimeter.

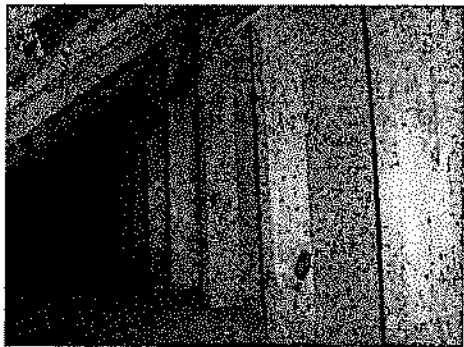
**Solution:** (Bring knee wall space into living space) Foam soffit vent baffles into place and extend them all the way to the top attic to ensure ventilation to that attic space. Add insulation to the roof joist cavity of the kneewall attic to achieve an R-value of at least 30. Cover the joist cavity with a rigid material such as foam board or drywall and seal all connections along the entire sloped ceiling cavity with spray foam, caulk, or spackle to ensure that the sloped ceiling cavity and soffit vents are completed sealed off from the kneewall attic space.



**Problem: Insufficient insulation and air sealing at knee walls**

Location: Kneewall Attics

**Solution:** The walls connecting to living space need to be air-sealed at all framing connections that would allow airflow into interior walls. Then install a layer of insulation and a continuous air barrier at the knee walls to achieve an R-value of at least 13.



**Problem: Clogged soffit vents**

Location: Attics

**Solution:** Free soffit vents from insulation parts and install vent baffles to ensure proper ventilation.



**Problem: Insufficient ventilation in attic**

Location:

**Solution:** We recommend increasing the ventilation in your attic to prevent moisture problems, lengthen the life of your roof, and help the attic insulation work at peak efficiency. If possible, install ridge or gable vents.



**Area of Focus: Insulation**  
**Your Score: 1 out of 5**

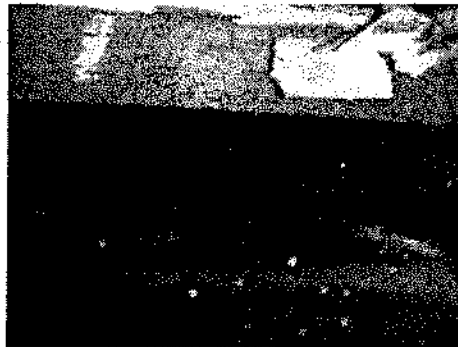
Your home's energy consumption is also related to the condition and R-Value of your insulation. One unit of R-value measures the level of protection from heat exchange with the outside. Your building envelope serves as the outer shell to ensure the comfort of your indoor environment as well as to facilitate its climate control and should be well insulated. A full inspection of your building insulation levels was performed during the audit. Areas where your insulation score could improve are:

**Problem: No insulation in exterior walls**

Location: Exterior walls

The exterior walls around the home do not appear to be insulated. The best time to have these insulated would be when the old siding comes off and before the new siding is installed. This way the insulation can be blown in from the exterior of the home and not damaging the drywall on the interior.

**Solution:** There is currently no insulation in the exterior walls. We recommend having cellulose insulation blown into the exterior walls to fill the stud cavity using the "dense-pack" process. This material is installed from either inside or outside and depends on the exterior material such as brick or interior such as wall paper. Note: Plan to do this if you are replacing your siding or repainting the interior.



Not the best picture but here you can see that there is no insulation in the exterior wall.

**Problem: Insufficient insulation in floor over unconditioned space**

Location: Crawlspace Below Kitchen Addition

**Solution:** We recommend adding insulation under the floor. The final R-value should be R-30 and the insulation needs to be protected by a continuous air barrier (rigid material).



**Problem: Insufficient insulation level in crawl space**

Location: Main Crawlspace

With regards to the crawlspace since there is duct work running through it the best solution is to install insulation on the walls of the crawl and apply a vapor barrier to the dirt floor.

**Solution:** (Bring crawl space into building envelope) Install a continuous vapor barrier to the floor of the crawl space or pour a concrete floor. Next, air-seal the rim joist and any openings to the exterior. Insulate the exterior walls to a minimum of R-13 to bring the crawl space into the building envelope.

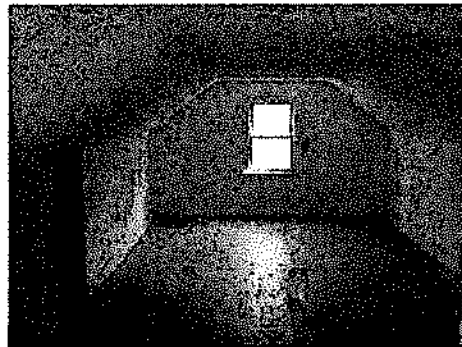
**Problem: Insufficient insulation in sloped ceiling**

Location: 2nd Floor Slopes

**Solution:** Fill cavity of sloped ceiling with blown-in cellulose or spray foam to achieve an R-value of 30-38. If open to the attic or to the connecting walls, seal off sloped ceiling at all openings using plywood and spray foam.



Here you can see the air gap between the insulation and the drywall. Have insulation blown in to fill this gap completely.



**Problem: No air-barrier over top of exposed insulation**

Location:

**Solution:** Fibrous insulation can only fulfill its purpose, if it is protected from exterior influences such as wind or moisture. The insulation at your vertical knee walls needs a continuous air barrier while the entire stud cavity should be filled with insulation, if not yet installed.



Someone had previously installed fiberglass on this kneewall but did not put a backing on the backside to encapsulate the insulation.



**Area of Focus: Fenestration**  
**Your Score: 2 out of 5**

Fenestration is just a fancy word for describing the condition of your windows and doors and how much of your conditioned air is lost through them. Our analysis of your fenestration was conducted during the Blower Door Test in conjunction with a visual examination of the integrity of your windows and doors. If there was an excessive amount of air exchange in these areas, look below to see if new windows or doors are recommended or if an air sealing project around the frame is all that is needed. Areas where your fenestration score could improve are:

**Problem: Broken or cracked window**

Location: Front Broken Window

**Solution:** One of the panes of your double pane window is cracked or broken. We recommend installing a storm window to increase your window's insulating value and reduce the likelihood of air leakage.



**Problem: Leaky exterior access door**

Location:

**Solution:** Adjust hinges and strike plate to close the door tightly.

**Solution:** Increase the weather-stripping at the exterior access door and install an effective door sweep.

**Solution:** Install weather-stripping at exterior access door and install an effective door sweep.

**Solution:** Replace brittle / broken weather-stripping at exterior access door and install an effective door sweep.

**Solution:** Install a storm door.





**Area of Focus: HVAC**  
**Your Score: 2 out of 5**

In our climate zone, you may spend more than 50% of your energy costs on powering your HVAC systems. If applicable, during your energy audit we have tested the safety and efficiency of your HVAC systems as well as the air quality that is being produced by your home's combustion heating source. This information is critical, as it produces the majority of air you breathe within your home. System 1

Combustion Furnace Diagnostics	Efficiency	Carbon monoxide	Draft Spillage	Worst Case Test
Your Test Results For Worst Case	80	PPM	N/A Fail	N/A
Your Test Results For Natural Case	80	10 PPM	10 10	10

No HVAC examination would be complete without a thorough visual inspection of your ductwork. This often forgotten part of the HVAC system acts as the highway for airflow within your home and plays a significant role in the energy needed to transfer conditioned air to all parts of your home. We recommend that you air seal any leaky ductwork you may find as these systems age. The best product for spot sealing is UL-181 aluminum foil tape available at your local hardware store. Areas where your HVAC score could improve are:

**Problem: Inefficient window A/C units**

Location: A/C units

The home used to be cooled by window A/C units. These are very inefficient and costly to operate. I strongly recommend installing a central A/C system in the home. If you do decide to run a gas line for a furnace consider installing a Heat Pump with a gas fired back up.

**Solution:** We recommend replacing your old window A/C unit(s) with an Energy Star model.

**Solution:** Central Air Conditioning is more efficient than window units when cooling a large area. If your home already has a ducted heating system or if a duct system can be installed, we recommend considering installing central A/C.

**Problem: Other**

Location: Heating System

Since there currently is no heating system in the home I could not perform a combustion safety test. When it comes time to install a HVAC system choose the most efficient type available in your budget preferably a 90% furnace or a heat pump with a gas fired backup system built in.

**Solution:** Please see specifications in auditor's note.

**Problem: Leaky ductwork**

Location: Duct Work

**Solution:** We recommend that you inspect and seal all accessible duct connections in unconditioned space with duct mastic or other appropriate duct sealing materials. We recommend that you also remove all registers and check if the duct is properly connected to the vent. Caulk any visible gaps and re-install registers.

**Solution:** We recommend that you perform duct sealing from inside the ductwork with an aroeseal internal duct sealant.

**Problem: Inefficient layout of duct system**

Location: Duct System

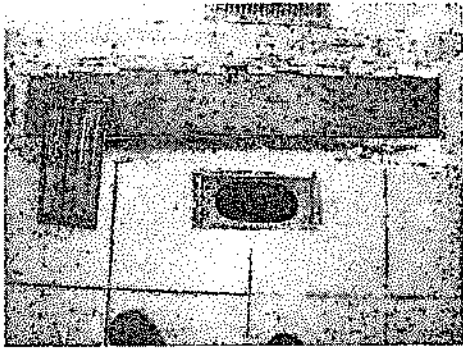
**Solution:** The flex ducts in the attic are layed in a very inefficient way that includes more turns and length of ducts than necessary. We recommend cutting all suspended ducts loose and lay them flat on the attic floor. Then disconnect them at one end, pull them tight and in a straight run from main trunk to the register. Cut off all excess material. Reconnect both layers of the duct separately and tightly. Seal connections air tight. Ideally, cover the ducts with additional attic insulation.

**Problem: Other**

Location: Kitchen Supply

One of the kitchen supply register does not have a duct line ran to it. This register is basically a hole to the outside. Make sure your HVAC company will fix this issue or have the hole sealed and covered.

**Solution:** Please see specifications in auditor's note.



**Area of Focus: Appliances & Lighting**  
**Your Score: 3 out of 5**

When it comes to your appliances, our Energy Services Group - Central Maryland energy detectives are looking for signs of inefficient energy use. These inefficiencies may be caused by the placement of the appliance within the home, appliance settings, or deterioration of the appliance and related systems. It is recommended that when your home's current appliances die that you replace them with Energy Star rated appliances. Please visit [www.energystar.gov](http://www.energystar.gov) for more information. Our Energy Services Group - Central Maryland energy detectives have been trained to assess your lighting fixtures and bulbs for inefficiencies. This includes suggesting areas where compact fluorescent light bulbs (CFLs) or LEDs may be implemented. CFL bulbs use 75% less energy and last about 10x longer than your current bulbs. LED bulbs use up to 90% less energy and last even longer. Please view the appendix for more simple tricks on how to reduce the electricity consumption in your home. Areas where your score could improve are:

**Problem: Inefficient household appliances**

Location: Appliances

**Solution:** We recommend that you replace your appliances step by step or whenever they die with Energy Star rated units. Replace refrigerators first, then washing machines, then freezers before replacing other appliances.

**Problem: Inefficient refrigerator / freezer**

Location:

**Solution:** We recommend that you replace your refrigerator/freezer with an Energy Star rated unit. Energy Star models consume at least 20% less electricity than non-qualified models.

**Problem: Inefficient light bulbs in some areas**

Location:

**Solution:** In some areas of your home CFL lighting can be implemented. We recommend that you spot check your home (including all recessed lights) and replace bulbs that are not CFLs in all areas where you leave the light on for more than 10 minutes at a time and where you need diffuse room lighting. CFL bulbs use 75% less electricity and last 10 times longer than incandescent light bulbs.

**Solution:** Implement LED lights in areas in and around your home where you need spot lights or where you turn the lights on and off very frequently.

**Area of Focus: Water Heating & Conservation**  
**Your Score: 3 out of 5**

Your domestic hot water system heats and delivers your hot water. During the audit we assessed the condition, efficiency and necessity of any cost-effective upgrades that may be retrofitted within your current hot water system. We would also like to inform you on techniques that will drastically reduce your consumption of our most precious natural resource. Please read below where your Water Heating and Conservation score could improve:

**Problem: Standard flow faucets**

Location: Bathroom sinks

**Solution:** Replacing your faucet aerators with low-flow aerators will help conserve water while the water stream will still be strong enough for regular use.

**Problem: Standard flow shower heads**

Location: Bathroom Shower

**Solution:** Replacing your shower heads with low-flow fixtures conserves a large amount of water. Low-flow fixtures do not restrict the water flow. Rather, they mix the water with air to reduce the amount of water used while maintaining a sufficient water pressure. They now come in different shapes and configurations.

**Problem: Water pipes need to be insulated**

Location: Water Heater

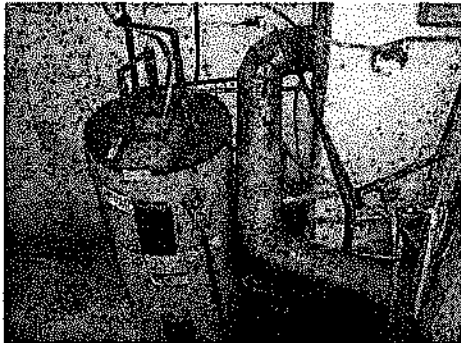
**Solution:** Insulate all accessible hot water pipes, especially the first 6', with foam tubing to reduce heat loss of the water during transport to your faucets. Please install the insulation material with a sufficient clearance from the flue pipe, if you have a gas water heater (1" to double walled B-vent flue pipes or 6" from single walled gas flues, and 18" from single walled oil flue pipes).

**Solution:** A portion of your water pipes are running through unconditioned space. In this case, all hot and cold water pipes need to be well insulated.

**Problem: Water heater is approaching its useful life expectancy**

Location: Water Heater

**Solution:** The hot water heater is working well at the moment and does not need to be replaced. However, its performance might decrease soon. Please monitor your water heater for excessive running times or rust, have it serviced every year, and prepare to replace it in the next 3-5 years with an Energy Star rated model.





**Area of Focus: Energy Management**  
**Your Score: 4 out of 5**

One of our goals is to help you transition your home into both a greener and healthier living environment. This portion of your audit will give you a list of simple techniques that may seamlessly fit into your daily life to help reduce your family's waste production and reduce your home's carbon footprint, if not already implemented.

**Problem: Manual thermostat**

Location:

**Solution:** Installing a programmable thermostat will allow you to control the temperature settings according to a pre-set schedule. This saves energy by reducing the degree to which you need to heat or cool your home during periods when you are away from the house or asleep.

# Thinking Renewable?

## Your Energy Choices for the Future

### Photovoltaic

Photovoltaic (PV) devices generate electricity directly from sunlight via an electronic process that occurs naturally in certain types of material. Electrons in certain types of crystals are freed by solar energy and can be induced to travel through an electrical circuit, powering any type of electronic device or load. PV Devices can be used to power small devices e.g. road signs, calculators or phone call boxes, homes, or even large stores or businesses. [www.gesia.org](http://www.gesia.org)

### Solar Hot Water

Have you ever felt warm water trickle out of a garden hose that has been sitting in the sun? If so, then you have witnessed solar water heating in action. Now imagine that same water moving slowly through a system specifically designed to heat and store water that is the essence of solar thermal water heating. People have for centuries used water heated by the sun and stored it for bathing, hand washing, cleaning clothes, heating homes and much more. The solar thermal systems used today combine the most efficient techniques for capturing the sun's heat with modern plumbing systems to produce cost effective hot water and reduce the need for gas or electricity to heat water. There are a number of different solar thermal designs, but all are based on the same simple principle as the garden hose. Each has its pros and cons, and each is suitable for a specific application. Consult with your local installer to determine which is best for your situation. [www.southface.org](http://www.southface.org)

### Tankless Water Heater

Demand (tank-less or instantaneous) water heaters provide hot water only as it is needed. Here you will find basic information about how they work, whether a demand water heater might be right for your home, and what criteria to use when selecting the right model. Demand water heaters heat water directly without the use of a storage tank. Therefore, they avoid the standby heat losses associated with storage water heaters. When a hot water tap is turned on, cold water travels through a pipe into the unit. Either a gas burner or an electric element heats the water. As a result, demand water heaters deliver a constant supply of hot water. You do not need to wait for a storage tank to fill up with enough hot water. However, water heater's demand limits the flow rate. Typically, demand water heaters provide hot water at a rate of 25 gallons (7.6 X 15.2 liters) per minute. Gas-fired demand water heaters produce higher flow rates than electric ones. Sometimes, however, even the largest gas-fired model cannot supply enough hot water for simultaneous, multiple uses in large households. For example, taking a shower and running the dishwasher at the same time can stretch a demand water heater to its limit. To overcome this problem, you can install two or more demand water heaters. You can also install separate demand water heaters for appliances such as a clothes washer or dishwasher that use a lot of hot water in your home. [www.eere.energy.gov/consumer/renewable\\_energy/](http://www.eere.energy.gov/consumer/renewable_energy/)

### Geothermal Heat Pumps

Geothermal heat pumps (sometimes referred to as Geo Exchange, earth-coupled, ground-source, or water-source heat pumps) have been in use since the late 1940s. Geothermal heat pumps (GHPs) use the constant temperature of the earth as the exchange medium instead of the outside air temperature. This allows the system to reach fairly high efficiencies (300%-600%) on the coldest of winter nights, compared to 175%-250% for air-source heat pumps on cool days. While many parts of the country experience seasonal temperature extremes from scorching heat in the summer to sub-zero cold in the winter, a few feet below the earth's surface the ground remains at a relatively constant temperature. Depending on latitude, ground temperatures range from 45F (7C) to 75F (21C). Like a cave, this ground temperature is warmer than the air above it during the winter and cooler than the air in the summer. The GHP takes advantage of this by exchanging heat with the earth through a ground heat exchanger. [www.eere.energy.gov/consumer/renewable\\_energy/](http://www.eere.energy.gov/consumer/renewable_energy/)

### How Wind Turbines Work

Wind is a form of solar energy. Winds are caused by the uneven heating of the atmosphere by the sun, the irregularities of the earth's surface, and rotation of the earth. Wind flow patterns are modified by the earth's terrain, bodies of water, and vegetation. Humans use this wind flow, or motion energy, for many purposes: sailing, flying a kite, and even generating electricity. The terms wind energy or wind power describes the process by which the wind is used to generate mechanical power or electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. This mechanical power can be used for specific tasks (such as grinding grain or pumping water) or a generator can convert this mechanical power into electricity. So how do wind turbines make electricity? Simply stated, a wind turbine works the opposite of a fan. Instead of using electricity to make wind, like a fan, wind turbines use wind to make electricity. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity. Take a look inside a wind turbine to see the various parts. View the wind turbine animation to see how a wind turbine works. [www.eere.energy.gov/consumer/renewable\\_energy/](http://www.eere.energy.gov/consumer/renewable_energy/)

## Glossary of Terms

- (BPI) Building Performance Institute** ~An organization that offers nationally recognized training, certification, accreditation and quality assurance programs
- Air Barrier** ~any part of the building shell that offers resistance to air leakage
- Air Conditioner** ~a mechanical refrigeration component used to cool buildings
- Air Exchange** ~the total building air exchanged with the outdoors through air leakage and ventilation
- Blower Door** ~a device consisting of a fan, removable panel and gauges used to measure and locate air leaks
- Btu (British Thermal Unit)** ~the quantity of heat energy required to raise the temperature of one pound of water one degree Fahrenheit
- Carbon Footprint** ~the total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons or pounds of carbon dioxide (CO<sub>2</sub>)
- Ccf (Hundred cubic feet)** ~measure of natural gas roughly equivalent to 100,000Btus. See therm
- CFL Bulbs (Compact Fluorescent Lamp)** ~compared to incandescent bulbs, spiral and tubular CFL bulbs give off the same amount of visible light, use less power and have a longer life. Will save on average \$30 over the life of the bulb and 2000 times its weight in greenhouse gases
- Combustion** ~burning or rapid oxidation, accompanied by release of energy in the form of heat and light
- Combustion Appliance** ~any appliance that uses the combustion process to generate energy
- DIY Projects** ~do it yourself projects in and around the home
- Energy** ~a quantity of heat or work
- Exfiltration** ~air flow out of a home to the outside (see Air Exchange).
- Fenestration** ~window and door openings in a building shell
- Green** ~A global campaign for all people to take responsibility to reduce their carbon footprint and promote a healthier life style
- Heat** ~the measure of thermal energy. Heat is exchanged by objects of different temperatures
- Infiltration** ~ air flow into a building from outside (see Air Exchange)
- Insulation** ~material with relatively high thermal resistance
- Joist** ~horizontal wood framing member that supports a floor or ceiling
- Kilowatt** ~a unit of electric power representing a rate of 1,000 Joules / second
- KWh (kilowatt hour)** ~a unit of electric energy equivalent to 3412 Btus.
- Power** ~a rate of energy
- R-Value** ~a term predominantly used in the building industry to describe the insulation properties of certain building insulation materials
- RESNET** ~an organization that sets national standards for building energy efficiency rating systems
- Reusable Drinking Water Bottle** ~a bottle, made from products that can be reused and is not thrown away after you have finished your drink. Look for a product that does not leach plastics into your water source
- Shell** ~a building's foundation, bottom floor, exterior walls and roof assembly
- Smart Strip Surge Protector** ~Smart Strips are power strips that eliminate vampire loads drained by appliances that are off or in stand by mode
- Therm** ~unit of energy equaling 100,000 Btus
- Thermal envelope** ~the continuous, insulated air barrier encompassing a living space. i.e. an enclosing wall, ceiling, or floor + insulation = thermal boundary
- Unconditioned Space** ~a space that is neither directly nor indirectly conditioned space, which can be isolated from conditioned space by partitions and/or closeable doors
- Vampire Load** ~refers to the electric power consumed by electronic appliances while they are switched off or in a standby mode
- Work** ~the transfer of energy from one physical system to another. Work = force x distance

