

HOME ENERGY AUDIT REPORT



CERTIFIED
PROFESSIONAL

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SUBMITTED TO:

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1 INTRODUCTION

1.1 The Energy Audit

Your energy audit was conducted on January 2, 2014. During the inspection your home's thermal envelope (insulation and/or air boundaries) and major mechanical equipment were evaluated. We also conducted several diagnostic tests on your home to help us quantify the energy efficiency of your home. The information gathered during the home inspection, in addition to your utility data, provided input to complete an energy model specific to your home.

The energy modeling results determined that your home's annual energy consumption is costing you approximately **\$3.908**. The results also facilitated the generation of a list of improvement opportunities that will lower energy consumption while maintaining or improving the health, safety and comfort of your family and home. We will go over this in greater detail later in this report.

1.2 Improvement Opportunities for Your Home

The goal of any home energy efficiency improvement is to reduce energy consumption while improving or maintaining occupant comfort and health and safety. Below is a brief summary of your improvement opportunities. We will take a closer, more detailed look at each of the recommended improvements throughout the report.

IMPROVEMENT	ESTIMATED COST	PROJECTED SAVINGS (per year)	SIMPLE PAYBACK (years)
95% Efficient Natural Gas Boiler	\$12,000	\$1,855	6
Mini Split Heat Pumps	\$20,000	\$1,726	11
Air Sealing	\$1,750	\$285	6
Attic Insulation	\$2,000	\$212	9
ENERGY STAR Windows (1 st & 2 nd Floor)	\$10,000	\$204	49
Heat Pump Water Heater	\$1,600	\$189	8
On Demand Gas Water Heater	\$2,300	\$168	14
Indirect Gas Water Heater	\$1,500	\$150	10
Basement Insulation	\$2,500	\$140	18
Missing Wall Insulation (1 st Floor)	\$1,250	\$75	17
ENERGY STAR Windows (Basement)	\$900	\$48	19

1.3 Benchmarking Your Home

Benchmarking is an effective method of comparing your home against the “average home” for our particular climate zone. The average home listed below is specific to detached single family homes in the Northeast Climate Zone.

Average Home Energy Usage
Total: \$2,418

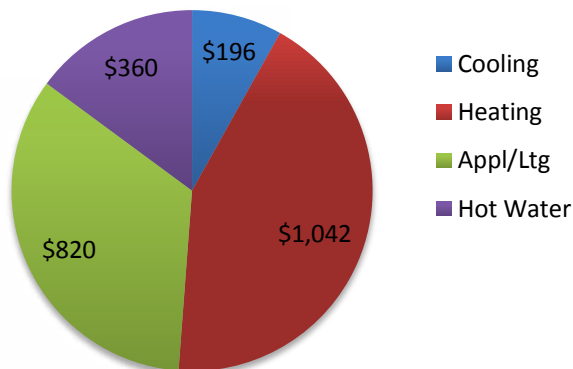


Figure 1a. Average Home Energy Usage

Your Home's Energy Use
Total: \$3,908

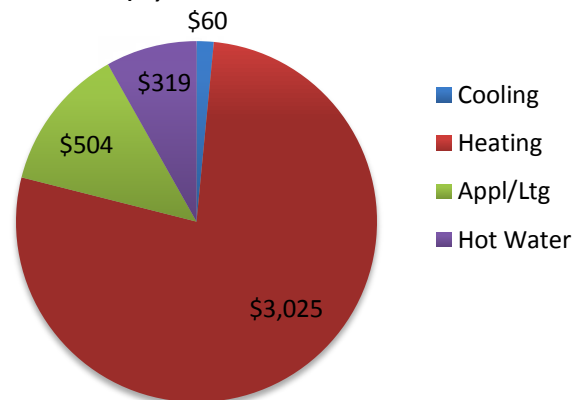


Figure 1b. Your Home Energy Usage

Because some homes are larger than others, and because different fuel sources can be more, or less, expensive than other fuel sources; we would like to show you how your home compares to the average home in more universal terms. All sources of energy can be converted to BTU's. Once we convert all of your site energy use to BTU's, we then normalize the data by calculating the BTU's consumed throughout the course of a full year per square foot of conditioned floor area of your home.

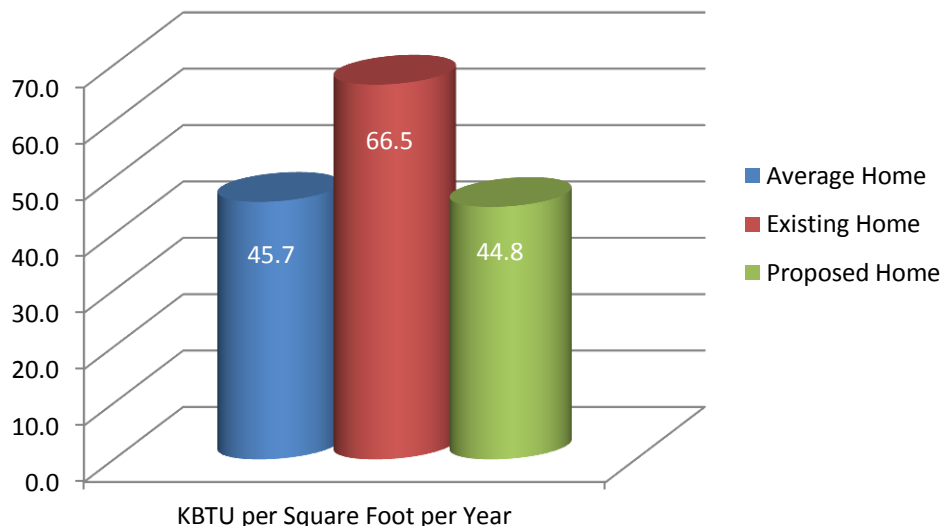


Figure 1c. Average vs. Existing vs. Proposed Home's Normalized Energy Consumption

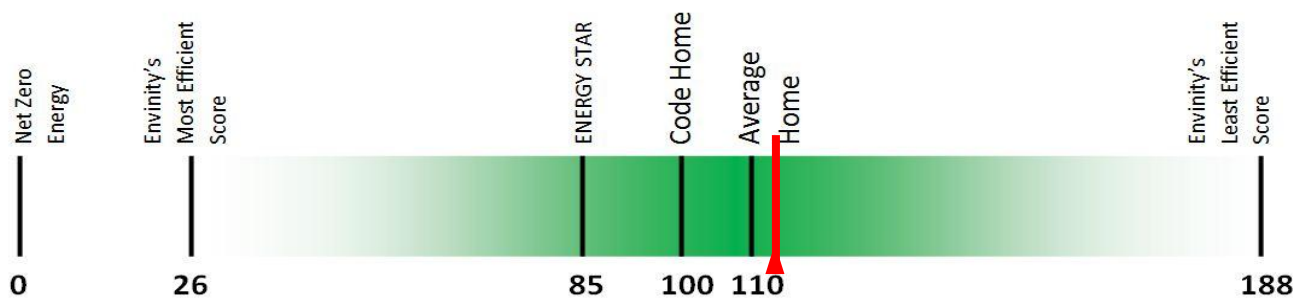
Proposed Home Includes: Natural Gas Boiler, Heat Pump Water Heater, Air Sealing, Attic Insulation, Basement Insulation, and Missing Wall Insulation

1.4 HERS Score

To further determine the energy efficiency of your home, and to analyze various improvement opportunities, we have modeled your home using EPA Accredited Software. This software has generated an efficiency rating or HERS Score (Home Energy Rating System Score) for your home. The HERS Score is also the preferred method of certifying new homes as ENERGY STAR Homes.

A HERS Score of 100 represents a home which is built to current code standards for new construction. A HERS Score of 85 or less is built to the standard of an ENERGY STAR home. And a home that has a HERS Score of '0' uses net zero energy through the year. A home that has a HERS Score of 84 is 1% more efficient than a home that has a HERS Score of 85. So, the lower the HERS Score, the more efficient the home is.

Your home has a **HERS Score of 112**. The HERS Score indicates that your home is relatively inefficient, but there is always room for improvement. A few simple fixes can significantly improve the energy efficiency, comfort, and durability of your home.



The difference between a HERS Score and the BTU per Square Foot concept is that the HERS Score assumes that the energy consumption in our homes due to our individual lifestyles does not change from home to home. For example, how often we leave the lights on, how long we are in the shower, how many loads of laundry we do, etc... are the same in every home and every family. We know this is not true, but it does give us a closer glimpse into how efficient a home is; regardless of who lives in it. So where the BTU per square foot graph shows how your home and your family's energy consumption compare to national averages for our climate region; the HERS Score is specifically related to the efficiency of the manner in which your home has been built.

2 YOUR HOME IN ITS CURRENT CONDITION

2.1 Health and Safety Considerations



Health & Safety issues should be corrected before making any energy improvements. High moisture levels, improper combustion venting or elevated carbon monoxide levels may be worsened by other improvements to your home. If you have any gas or oil fired appliances in your home, we have tested them, and here are the results. If your home is all electric, no combustion testing is needed.

The following health & safety tests were conducted in your home:

Combustion Gas Spillage Test – PASSED (Emissions Spilled for 0 Seconds)

The Combustion Gas Spillage Test examines your current combustion appliances for spillage of emissions into your home. Most combustion appliances spill for a short period of time, especially when they are first starting. An appliance that spills emissions for more than 60 seconds fails the test and corrective action is needed. This is often due to a clogged or restricted chimney.

Appliance Carbon Monoxide (CO) Test – PASSED 3 parts per million

The Appliance Carbon Monoxide test examines the concentration of CO inside of the chimney/flue that is designed to vent the emissions of the combustion process out of your home. If levels of CO in the emissions of your combustion appliance exceeds 26 parts per million, correction action is highly recommended. If they exceed 100 parts per million corrective action is needed. CO is produced from incomplete combustion, so often times a clean and tune of your appliance is the best fix.

Ambient Carbon Monoxide (CO) Test – PASSED 0 parts per million

The Ambient Carbon Monoxide test examines the inside of your home for the presence of CO. All homes with combustion appliances and/or attached garages must to have UL2034 listed carbon monoxide detectors installed in the appropriate locations. If levels of CO in your home reach 35 parts per million the appliance creating the problem should be disabled and the home should be evacuated and ventilated until levels fall below 35 PPM. The appliance should then be repaired or replaced.

Combustion Appliance Draft Test – PASSED (Sufficient Draft Pressure)

The Combustion Appliance Draft Test evaluates the risk that the combustion gases in your home's flue(s) will be drawn back into your home by a source of negative pressure (e.g. clothes dryer, bathroom fans, etc...) If a combustion appliance does not have sufficient draft pressure corrective action is required.

Other Health & Safety Concerns:

During your energy audit inspection, we studied your home for the potential of harmful material and conditions in your home that may compromise the health and safety of you and your family. There were no health and safety concerns that were identified at the time of your energy audit.

2.2 Insulation Levels and U.S. Department of Energy Recommendations

Insulation is measured using 'R-value'. R-value is the ability of a material to reduce heat loss. As the R-value increases, heat loss is reduced. Insulation is adversely affected by moisture, dust, age, and installation quality. Proper installation of insulation in your home will not only reduce conductive heat loss by increasing the R-value but commonly reduce the air infiltration rate as well.

HOME COMPONENT	YOUR HOME'S R-VALUES	US D.O.E. RECOMMENDED R-VALUES
Attics / Ceilings	11	49
Above Ground Walls	11	20
Basement Walls	11	15
Basement Ceilings	0	25

Figure 2.2a. U.S. D.O.E. Recommended Insulation Values for Central Pennsylvania



The insulation levels in your home are under the recommended amounts, and we suggest not to look past this as you consider improvements to the mechanical systems in your house. A well-sealed and insulated building will work much better with a high efficiency system like a new gas boiler or a heat pump of any kind. The attic insulation will be difficult to improve over the 2nd floor due to lack of space and access. However, the small attic spaces over the 1st floor that are accessible from the 2nd floor are easy targets to improve the efficiency and comfort of your home. This, more than anything, would drastically improve the comfort of the 2nd floor and bonus room.



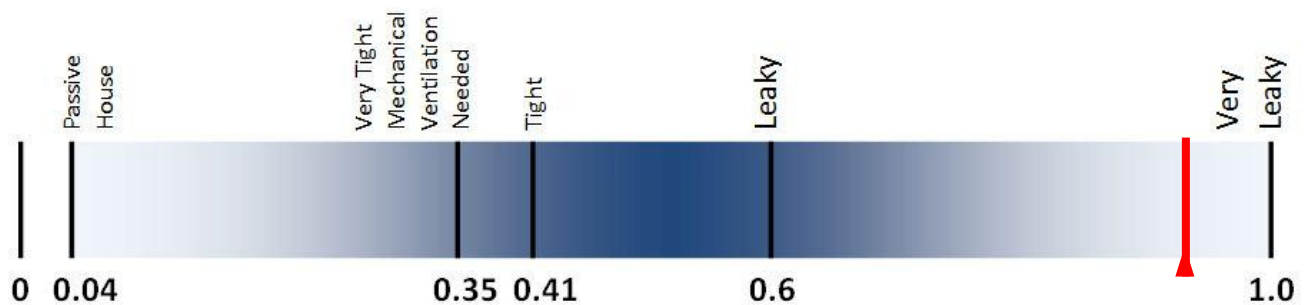
The basement walls do not need to be insulated in an unheated basement, but the basement ceiling should be insulated. The opposite applies to conditioned (heated/cooled) basements; the walls in a conditioned basement should be insulated and the basement ceiling does not need to be insulated. Furthermore, any walls (partition walls) that separate conditioned basements from unfinished basements should be insulated as well. The walls in the heated part of your basement are insulated, but the wall that separates the two basement sections is not insulated. Additionally, the ceiling of the unheated basement is not insulated. We suggest improving the insulation on both of these surfaces. Fiberglass batt insulation is probably the least expensive and easiest to use material for this job.

2.3 Air Leakage Test



Air leakage is the direct exchange of indoor air with unconditioned, outdoor air at ambient temperatures. Air leakage is typically a significant loss of heating/cooling dollars within a home. A reduction in air leakage will improve the comfort of your home while reducing the energy used to heat and cool your home. The air leakage rate for your home, as determined by the blower door test, is **0.93 Natural Air Changes per Hour (ACH_N)**. ACH_N is defined as the percentage of time the conditioned air within your home is exchanged with outdoor unconditioned air. For example, a home with an ACH_N of 1.0 would exchange 100% of its air every hour. A home with an ACH_N of 0.5 would

exchange 50% of its air every hour.

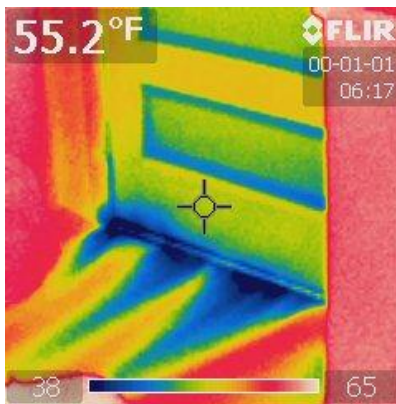


Your home should not be “tightened” below 0.35 ACH_N without automatically controlled mechanical ventilation. And Envinity will always retest your home after we have done air sealing, or any other work that would impact the air exchange rate of your home. An average ACH_N for home in our area is 0.45 – 0.60. Houses with less than 0.45 ACH_N are considered tight; and homes with an ACH_N over 0.60 are considered leaky.

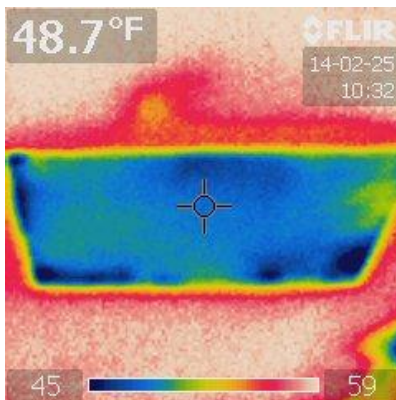
The blower door test and visual inspection detected the following areas for moderate to severe air leakage:

- **Attic Access Hatches**
 - Seal with weather stripping and insulate with rigid foam board fastened to backside
- **Open Floor Framing Under Knee Wall (Cope Cod Construction Detail)**
 - Install and air seal blocking under the knee wall, between each floor joist
- **Back Door**
 - Install new weather stripping
- **Fireplace**
 - Install a chimney balloon
- **Floor Drain in Basement in Depressurized by Radon Fan**
 - Consider sealing floor drain and discharging dehumidifier elsewhere

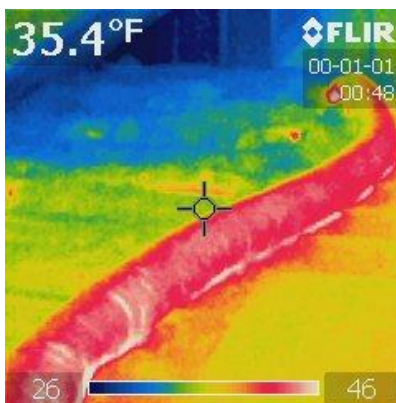
2.4 Infrared Images



The image to the left shows cold air leaking in through the bottom of the back door. We recommend installing new weather stripping and making some adjustments to the threshold to create a better air seal.



The image to the left shows heat loss and air leakage around an uninsulated attic access hatch. The hatch should be sealed with weather stripping and insulated with rigid foam board.



The image to the left shows heat loss from duct work in the attic. We recommend sealing and insulating all duct work; especially in attics and in unconditioned basements, garages, and crawlspaces.

2.5 Heating & Cooling Systems



Your home is currently heated with an oil boiler. This type of heating system offers great comfort in the sense that it has enough heat capacity to keep you warm in any weather. Unfortunately, oil heat is considered highly inefficient, and this is becoming more expensive over time. Thankfully, there are quite a few options available to improve the heating and cooling efficiency for your home. I am suggesting that you focus on the conversion to a high efficiency natural gas system. We will take a look at a couple of options later in this report. Your current heating system has the following efficiency and output ratings:

- **Heating efficiency = 78 Annual Fuel Utilization Efficiency (AFUE)**
- **Heating output = 130,000 Btu/hr**

Your home is cooled with window mounted air conditioners. Because of our abbreviated cooling season it is typically not a high priority to focus energy improvements on the cooling side. However, the opportunity to install a heat pump for heating also offers more efficient cooling at the same time. We'll take a closer look at heat pumps later in this report.

Heating and cooling loads are used to ensure that properly sized heating and cooling equipment is installed, used, and maintained in our homes. The size, construction, and energy consuming features of your home have all been factored into the calculation of the heating and cooling loads for your home:

- **Heating load = 47,100 Btu/hr**
- **Cooling load = 21,900 Btu/hr**

It is important to make sure that a new heating/cooling system is designed to meet the heating and cooling loads of your home. And please keep in mind that any changes to your home (i.e. – air sealing, insulating, etc...) will ultimately decrease your heating load and can lead to saving money on a new heating system by enabling you to purchase a system with a lower energy output.

2.6 Water Heating System



The existing water heater is a 50 gallon electric storage tank/water heater. The water heater is getting old and is definitely a good candidate for early replacement. To help you identify the best way to improve your water heating system, I have compared a few options for you. A popular choice is the On Demand Water Heater. However the Heat Pump Water Heater is my personal favorite. And you have the opportunity to tie in your water heating to your space heating with a new boiler and an Indirect Water Heater. Alright let's take a look!

3 OUR RECOMMENDED IMPROVEMENT OPPORTUNITIES

The goal of any home energy efficiency improvement is to reduce energy consumption while improving or maintaining occupant comfort and health and safety. Table 3a outlines the cost and benefit of each of your improvement opportunities. The Estimated Cost is a rough estimate of what each improvement should cost; this is not a binding number. The accuracy of the projected savings is ensured by our energy modeling and utility bill analysis.

Table 3a. Cost Benefit Analysis

IMPROVEMENT	ESTIMATED COST	PROJECTED SAVINGS (per year)	SIMPLE PAYBACK (years)
95% Efficient Natural Gas Boiler	\$12,000	\$1,855	6
Mini Split Heat Pumps	\$20,000	\$1,726	11
Air Sealing	\$1,750	\$285	6
Attic Insulation	\$2,000	\$212	9
ENERGY STAR Windows (1 st & 2 nd Floor)	\$10,000	\$204	49
Heat Pump Water Heater	\$1,600	\$189	8
On Demand Gas Water Heater	\$2,300	\$168	14
Indirect Gas Water Heater	\$1,500	\$150	10
Basement Insulation	\$2,500	\$140	18
Missing Wall Insulation (1 st Floor)	\$1,250	\$75	17
ENERGY STAR Windows (Basement)	\$900	\$48	19

Estimated costs include federal, state, and local rebates, incentives, and tax credits

3.1 95% Efficient Natural Gas Boiler



Newer, more efficient, boilers can achieve efficiencies of 95% or better. In addition to burning fuel more efficiently, newer systems have been designed to get every ounce of heat out of them as efficiently as possible. The modulating feature of new boilers refers to the manner in which they match your home heating needs with respect to varying outdoor temperatures. For instance, your home does not need as much heat when it is 50°F outside as it does when it is 10°F outside. A modulating boiler knows this, identifies this, and adjusts its heat output accordingly. This helps to save energy and will improve the comfort of your home.

Perhaps the single most important reason to consider a high efficiency boiler is that they are sealed combustion appliances. That means that air coming into the boiler for combustion comes from outside. Furthermore, emissions leaving the boiler are vented directly outside without relying on very sensitive pressure differences to pull the emissions through a chimney. Ultimately, sealed combustion appliances practically eliminate the risk of carbon monoxide exposure from your heating system. Systems that are not sealed combustion appliances always have the potential to backdraft carbon monoxide into your home.

3.2 Mini-Split System Heat Pump



Mini-split-system heat pumps make good retrofit add-ons to houses with "non-ducted" heating systems, such as hydronic (hot water heat), radiant panels, and electric baseboard & ceiling heat. They can also be a good choice for room additions, where extending or installing distribution ductwork is not feasible. Like standard air-source heat pumps, mini splits have two main components: an outdoor compressor/condenser, and an indoor air-handling unit.

The main advantages of mini splits are their high efficiency ratings and flexibility for zoning. Many models can have as many as four indoor air handling units connected to one outdoor unit. The number depends on how much heating or cooling is required for the building or each zone (which in turn is affected by how well the building is air sealed and insulated). Since each of the zones will have its own thermostat, you only need to condition that place when someone is there.

Since mini splits may have no ducts, they avoid the energy losses associated with ductwork of central forced air systems. Duct losses can account for more than 30% of energy consumption for space conditioning, especially if the ducts are in an unconditioned space such as an attic.

Mini split heat pump systems offer great comfort year round with highly efficient heating and cooling. Systems can be designed and installed to heat and cool an entire home; they can also be designed to handle only the areas that you wish to initially address.

The most important thing to know is that there is VERY little difference between and air conditioner and a heat pump; including cost.

3.3 Air Sealing



Air sealing is typically the most affordable and practical way to improve energy efficiency and enhance comfort in our homes. Most air sealing work can and should be done in conjuncture with insulation work. This ensures that the air barrier and the thermal barrier of your home are aligned.

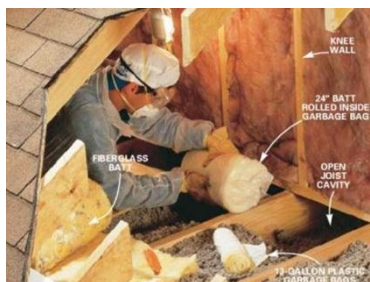
The stack effect is the driving force behind air leakage in our homes. It is primarily caused by pressure and temperature differences inside and outside

of our homes. And when temperature differences are at their greatest, so is the stack effect, and so is the air leakage rate.

The stack effect also makes it such that the highest rates of air leakage occur at the highest and lowest points in our homes. Lower areas of our homes, such as basements, crawlspaces, and garages, are where air will generally enter our homes most significantly. As the outdoor air enters our homes, it gains temperature and becomes more buoyant. This allows the air to rise through our living space as it pulls heat out of the air, and eventually leaves through air leaks at the highest points in our homes.

This is why you will find that most of our air sealing recommendations are focused in attics, basements, garages, and crawlspaces. If we are able to seal the areas that have the most impact, we can very easily improve the comfort and efficiency of your home.

3.4 Additional Attic Insulation



Attics and ceilings are typically the most important place to have significant insulation. Hot air is less dense than cold air so it tends to rise, and enormous amounts of energy can be lost when there is not a substantial amount of insulation in place. Currently, there is a slightly inadequate level of insulation in your attic (R-11). A home built to current building code standards must have at least R-38 in the ceiling. And the U.S. Department of Energy recommends insulating attics/ceilings in our climate region up to R-49.

We recommend insulating the knee walls around the 2nd floor, as well as the floor of the attic that rests over the 1st floor. We should talk details about how you would like to space to be finished off. You may want some area for storage, and we are happy to accommodate that. We just need to communicate everything up front.

3.5 Energy Star Windows



ENERGY STAR qualified windows and doors save you energy and money, increase the comfort of your home and protect your valuable possessions from sun damage. Your window replacement may not have a realistic economic payback, but other benefits (e.g. reduced infiltration and enhanced re-sale value) make the improvement worth considering. Prices can vary greatly when considering window replacements; typically between \$8,000 and \$30,000. Wood windows offer unique character to a home; but vinyl replacements are generally less expensive. The ENERGY STAR standard for windows in our climate region is a U-value of no greater than 0.3 and a Solar heat gain coefficient of no greater than 0.3.

3.6 Heat Pump Water Heater



Manufacturers are bringing many kinds of advanced water heaters to the U.S. market, with much higher efficiency. The big news for electricity users is the Heat Pump (or Hybrid) Water Heater, which like any other heat pump takes energy from the air to heat water. At the same time, the heat pump water heater dehumidifies the air, saving the cost of buying and operating a separate dehumidifier. This is especially beneficial when the water heater is located in a basement and/or in a humid climate.

Heat pump water heaters make some noise when they operate. This is often compared to a refrigerator or dehumidifier in terms of its noise level. So keep that in mind. And it will make the room in which it operates slightly cooler, but only by a couple degrees.

3.7 On Demand Gas Water Heater



Tankless water heaters are becoming more and more popular in the United States. They can significantly decrease standby losses that are commonly associated with storage water heaters. Highly efficient models will have no standing pilot light, modulating gas input rates (and corresponding Btu outputs), and will have an energy factor of 0.95 or so. These are sealed combustion appliances, so they reduce or eliminate the potential risk of carbon monoxide exposure in your home. One thing to be aware of is that they do scale with hard water more aggressively than other water heating options. So please consider a water softener if you are considering a tankless water heater.

3.8 Indirect Gas Water Heater



If you use a boiler, ask your contractor about the feasibility of installing an indirect water heater. These use your boiler as the heat source by circulating hot water from the boiler through a heat exchanger in a well-insulated water heater tank. In the less common furnace-based systems, water in a heat exchanger coil circulates through the furnace to be heated, then through the water storage tank. An indirect water heater is one of the best options because it eliminates the tremendous flue losses associated with gas-fired storage water heaters but without the hassles and extra costs of tankless gas water heaters. When used with a modern, high-efficiency boiler, these energy savings hold true even in the summer when your boiler isn't needed for heat. These systems can be purchased in an integrated form, incorporating the boiler and water heater with controls, or as separate components.

3.9 Basement Insulation



It is quite beneficial to insulate the ceiling of unconditioned basements, crawlspaces and garages with living space over them. These areas in a home are typically much cooler than the rooms on the first and second floor, and a significant amount of energy can be preserved by separating your basement from your home with a properly installed layer of insulation. This will be of a greater benefit to you if your heating system is improved to a more efficient heating system because a new / more efficient system will not have as much standby heat loss; thereby reducing the temperature in your basement; and thusly increasing the rate of heat loss from your home to your basement.



We generally recommend using spray foam insulation around the perimeter of the basement walls. The spray foam acts as a great insulator and air barrier at this critical point. Once the spray foam has been installed, we generally recommend insulating the rest of the ceiling with fiberglass.

A basement insulation job in your home should also include insulating the wall between the heated and unheated sections of your basement.

3.10 Missing Wall Insulation



It is very important to insulate the walls of a home because the walls are directly adjacent to the outdoors. Heat loss is accelerated as the temperature difference between indoors and outdoors increases. Currently, 14' of the Southwest facing wall on your first floor is uninsulated. Insulating the walls of your home with dense-pack cellulose is also a very effective way to air seal your home. Because this

would be a pretty small job, it's probably best to consider adding it to a more comprehensive work scope so we can work the cost down a bit.

4 YOUR PROPOSED HOME IMPROVEMENT PACKAGE

So now let's take a look at how your home is performing today compared to how your home could be performing tomorrow. We have compiled our top improvement recommendations into a proposed home for you, to show you how much of a difference you can make right now.

Your Home's Energy Use
Total: \$3,908

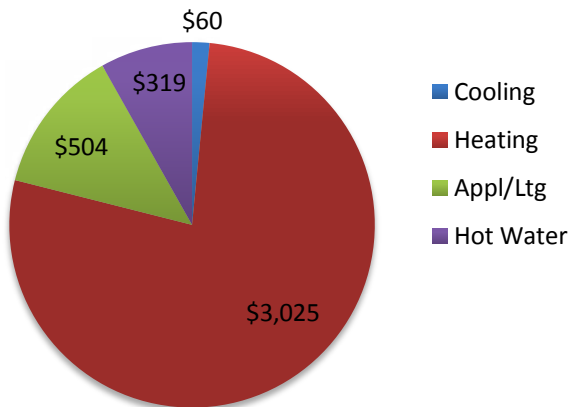


Figure 4a. Existing Energy Consumption

Proposed Energy Use
Total: \$1,561

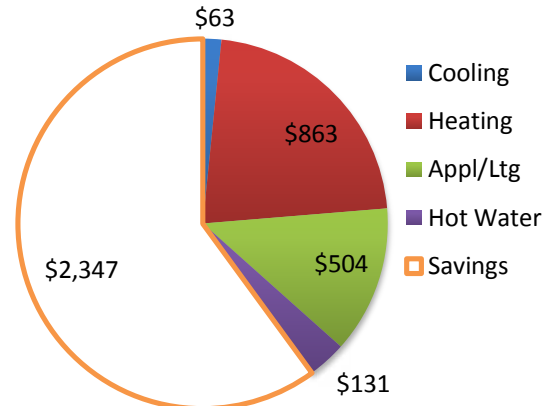


Figure 4b. Proposed Energy Consumption

The energy improvements that have been recommended throughout this report have the potential to significantly reduce your energy consumption and the associated energy costs. Beyond that sometimes, is the ability to drastically improve the comfort and health & safety of your home by implementing meaningful, well thought out improvements. And comfort definitely counts.

Our proposed home for you includes the following improvements:

- Natural Gas Boiler
- Heat Pump Water Heater
- Air Sealing
- Attic Insulation
- Basement Insulation
- Missing Wall Insulation

Here is a summary of the simple payback on your proposed home:

Estimated Cost	= \$21,100 (after tax credits, rebates, etc.)
Predicted Savings	= \$2,437 per year
Simple Payback	= 8.6 years

If this project were to be financed with a Keystone HELP Loan at 2.99%:

Your monthly payment would be	= \$205
Your monthly savings would be	= \$203

The change in your monthly budget = \$2

4.1 Taking Action



It is a fact that Americans account for only 5% of the world's population. It is also a fact that we account for a whopping 20% of the world's energy consumption. This imbalance creates a problem, but it also provides a unique opportunity for all of us to contribute to a solution together. Furthermore, it is no secret that increased energy consumption, and the associated emissions, continue to fuel climate change.

This is your opportunity to improve your life now, and to protect the futures of those for whom you care most deeply. Energy improvements to your home today will not only put money back in your pocket, make you more comfortable in your own home, and improve the health, safety, and durability of your home; they will contribute to a greater good.

From a purely financial perspective, it's hard to find a better investment than energy efficiency. With turbulence in the stock market, and the continually rising costs of energy; energy efficiency provides a level of guaranteed savings that other options cannot.

So please take all of this into consideration as you think about your next steps. It is easy to underestimate how much of a difference that you can make. But sometimes the most costly decision is to do nothing. Envinity is here to provide services and support to accomplish whatever it is that you desire.

4.2 A Vertically Integrated Energy Efficiency Company



sustainable homes in Central Pennsylvania.

Envinity opened its doors for business in 2005, and has been enjoying being able to contribute to improving the housing market in our region ever since. We started as a Green Design and Construction firm, focused solely on designing and building

As Envinity evolved over the years, we learned that we should be using our expertise in existing homes as well. And now we are pleased to provide all of the following services to all new and existing homes:

- Green Building
- Timber Framing
- Energy Audits
- Home Performance Contracting
- Heating, Ventilation, and Air Conditioning Installation and Service
- Mechanical, Electrical, and Plumbing Installation and Service
- Renewable Energy Systems Installation and Service

A vertically integrated company is one which can handle all aspects of design, planning, installation, and service. Working with Envinity ensures that you will have all of the in-house expertise you will ever need. Please visit <http://envinity.com/envinity/ourteam.php> to learn more about our team. We look forward to serving you.



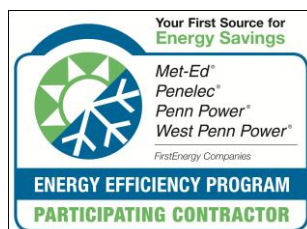
5 FINANCING & INCENTIVE OPPORTUNITIES

5.1 Keystone HELP Loan with AFC First Financial



Keystone HELP is a great resource for homeowners that are eligible for financing. The best thing about financing energy improvements is that the energy savings is usually enough to pay for all or most of your loan payment; thereby reducing the effect on your monthly budget. That way, you get the home you want without the sticker shock. With interest rates as low as 2.99%, it's hard to beat what AFC First is able to offer with their Keystone HELP Loan. For more information, see www.keystonehelp.com or call 1-888-AFC-FIRST.

5.2 First Energy Residential Energy Audit Program



The First Energy Residential Energy Audit Program provides a \$250 rebate for your energy audit. The program also offers an incentive of \$0.10 per KWh reduced by qualified energy saving work that is done to your home. Qualifying work includes air sealing, insulation, HVAC equipment, windows & doors, and more. This incentive can range from \$0 to over \$1,000. It all depends on how much energy is saved. It is important to note, that qualifying work must be completed within 180 days of the energy audit to be eligible for the incentive. Please visit www.energysavepa.com for more information.

5.3 2013 Federal Tax Credits



10% Federal tax credits for windows, door, insulation, air sealing, etc... are back. Federal tax credits of up to \$300 are available for heat pump water heaters, furnaces, boilers, heat pumps, and air conditioners. These credits are applicable for any work done before December 31, 2013. And, there is still a 30% federal tax credit for ground source heat pumps, solar photovoltaic, solar thermal, and small wind projects. These tax credits are active through December 31, 2016. Please visit http://www.energystar.gov/index.cfm?c=tax_credits.tx_index for more information.

5.4 Solar Financing & Incentives

Federal Tax Credit for Solar

There is a 30% federal tax credit that is active through December 31st, 2016. The 30% tax credit is applied to the total cost of the system. So for example, if a solar electric system costs \$25,000 to install, you would get a \$7,500 tax credit; and the net cost of your system would be \$17,500.

12 Months Same-As-Cash with Envinity & Sunpower

In partnership with SunPower, we also offer a no-interest bridge loan that gives homeowners one year of interest-free financing of up to \$45,000. This gives homeowners time to collect their incentives before spending capital.

Unsecured Solar Loan

SunPower offers a 5-year solar loan (fixed payment) and a 5-year solar loan with 10 and 15 year amortization (with balloon payment). Interest rates are between 6-9%, depending on credit.

Solar Renewable Energy Credits (SRECs)

Along with every 1,000 kWh your solar system generates, it will also produce one SREC. SRECs are used by utilities in many states, including Pennsylvania, to meet their Renewable Portfolio Standard requirements. As your system produces SRECs, an aggregator will bundle them and sell them, allowing you to generate additional income.



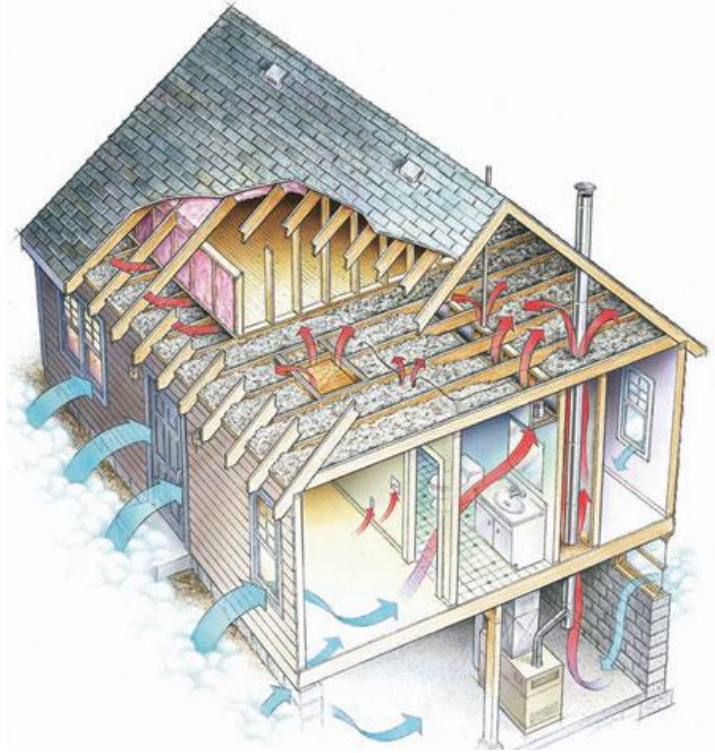
More information on SRECs can be found at www.envinitysolar.com.

6 APPENDICES

6.1 Building Science – The House as a System

Building science is the collection of scientific knowledge that focuses on the analysis and control of the physical phenomena affecting buildings today. It traditionally includes the detailed analysis of building materials, building envelope systems, and building mechanical systems. The intent is to determine the site specific relationships between moisture, air, and energy; and to understand how they impact the comfort, health & safety, and energy efficiency of our homes.

Through the study of building science, we have gained knowledge of the House as a System concept. In short, the House as a System explains that if you change one aspect of the home, other aspects of the home are affected. For example, air sealing a home can affect indoor moisture levels and/or draft pressures on a furnace. We take this aspect of our job very seriously. And we carefully document and adjust to these changes before, during, and after any work is done on your home.



Envinity is a participating contractor in the Home Performance with Energy Star Program. That means that at least 5% of our work is subject to random 3rd party quality assurance inspections. The quality assurance inspections address the accuracy of our work related to:

- Inspection methodology and documentation
- Existing conditions reported to clients
- Predicted savings reported to clients

Unlike typical energy audit programs, the goal of Home Performance with ENERGY STAR is to turn recommendations into improved homes. Participating contractors complete the needed renovations or work closely with other participating contractors who can. Envinty is a full service company, and we can provide just about any improvement to your home that interests you. Another important element of Home Performance with ENERGY STAR is that, upon project completion, the contractor assesses the home's performance again to document that specified improvements were properly installed to achieve the projected energy savings. Finally, all participating contractors are subject to quality assurance reviews by the third-party sponsor to ensure that projects meet program standards and homeowners are assured of high-quality work.

6.2 Lights and Appliances

The term “Baseload Energy Consumption” refers to the energy that is used in your home that does not include heating and cooling. In most homes, this includes lighting, appliances, and water heating; items that are used regardless of the season. There are many ways to effectively reduce your baseload energy consumption.



When they are ready, your major household appliances should be replaced with ENERGY STAR models. The ENERGY STAR website (www.energystar.gov) has all the information you will need to learn about replacing your existing appliances. Typically, older refrigerators, freezers, and clothes washers are the first priority to replace. Other appliances that are typically energy hogs if they are at least ten years old are dishwashers and dehumidifiers.



Outside of replacing major appliances, most baseload energy improvements are low cost. The average shower head moves 2.5 gallons per minute of hot water. A high efficiency shower head moves somewhere in the range of 1.5 gallons per minute of hot water. That means for every 10 minute shower, you are saving 10 gallons of hot water.



ENERGY STAR qualified lighting provides bright, warm light but uses about 75% less energy than standard lighting, produce 75 percent less heat, and lasts up to 10 times longer. This is one of the easiest and most affordable ways to save money and save energy at home. If every American home replaced just one light bulb with an ENERGY STAR qualified bulb, we would save enough energy to light more than 3 million homes for a year, more than \$600 million in annual energy costs, and prevent greenhouse gases equivalent to the emissions of more than 800,000 cars.



Standby power refers to the electric power consumed while appliances and devices are switched off or in a standby mode. Some very common standby loads are power supplies (computers and TVs), transformers (phone chargers), and instant-on features (remote controls). Standby energy consumption may be necessary to provide useful functions, but according to the U.S. Department of Energy, “In the average home, 75% of the electricity used to power home electronics is consumed while the products are turned off.” It is estimated approximately 10% of residential power consumption is due to phantom loads. Smart Strips are surge protectors that are designed to reduce or eliminate standby energy consumption. Smart strips are ideally suited to save energy at large entertainment centers and/or computer stations.

6.3 Basic Energy Saving Tips

Lower the Set-Point on Your Thermostat in Winter

Reducing your set-point by 1° for an entire winter can yield a 3% savings in energy used to heat your home. If you keep your thermostat at 70° try to turn it down to 69° for a week and see if that's okay. If so, try 68° and keep going down until you get to a point where you are no longer comfortable. Then go back up 1° and hold it there.

Use Window Treatments to Control Solar Heat Gains in Summer & Winter

Often times, we can capture the heat energy provided by the sun in our homes. In the winter, on a sunny day, it can be extremely beneficial to leave the blinds and curtains open on East, South, and West facing windows to let the sun provide free heat. On the other hand, it is advisable to keep the blinds and curtains drawn during the cold evening hours to reduce heat loss through the windows. During the summer, keep the blinds drawn on the sunny side of your home to prevent overheating.

Not All Systems Work Well With All Programmable Thermostats

This is important. If you do a little research online, you will probably get overwhelmed rather quickly with contradicting stories about programmable thermostats. That's because they work well with some systems, and terribly with others. Systems that do not work well with programmable thermostats are older heat pump systems, even within 10 years old. This is because you can actually force your heat pump to use supplemental heat to account for the temperature increase, and you are better off just leaving it at a certain temperature; or at least with 2 degrees all the time. Another system that does not work well with setback thermostats is a high mass boiler. This is because of the lag time in heating up heavy pipes and radiators. This does not apply to radiant baseboard heat. I am talking about the big cast iron radiators. A programmable thermostat will work well on just about any other system.

Shut and Lock Windows in Winter

Windows that are shut and locked reduce the air leakage around the windows when compared with unlocked windows. It is especially beneficial to do this during the winter when the temperature difference between indoors and outdoors is at its most extreme. Also, be sure to remove air conditioners from windows in the winter.

Operating Fans

The best thing to remember with fans is that they cool people, they do not cool rooms. The air movement that fans create pulls heat and moisture off of us, and gives us a cooling sensation. They do not actually decrease room temperatures. So please be sure to leave fans off when not in the room. In most cases it is also not recommended to leave the fan running on your furnace or air conditioner.

Lower the Set-Point on Your Water Heater

If you never run out of hot water, you can probably turn the set-point of your water heater down. The turn dials are typically located under the top and bottom faceplates. Use a screwdriver to remove the faceplate and turn it down 5-10°. We do not recommend setting your temperature below 120°F due to bacterial growth. Also, have the scale removed from your water heater every couple of years.

6.4 Water Efficiency Tips

Water use is becoming an increasingly important issue. Energy is used to extract the water from the ground, treat it, pump it to your home, and heat it in your hot water tank. Energy is also consumed to pump, treat and discharge the water once it leaves your home. The efficient use of water in your home reduces the energy consumed within our community. From major appliances to little things like showerheads, there are many high efficiency options available on the market.

High efficiency showerheads

Showering represents approximately 17% (or more than 1.2 trillion gallons per year) of indoor household water use in the U.S., according to the EPA. High efficiency showerheads use less than the federal standard of 2.5 gallons per minute by often aerating the water stream. The result is the same feel and cleaning capacity of a 'regular' showerhead, while reducing water consumption by up to 50%. A high efficiency showerhead should move 1.5 gallons per minute. This will be listed on the packaging of the item itself.

ENERGY STAR clothes washer

ENERGY STAR qualified clothes washers use 10 – 50% less energy and water than standard models. In addition to the obvious water and energy savings; ENERGY STAR washers have been known to leave clothes dryer than older machines; Thereby enabling you to use your clothes dryer less often. Keep in mind that the more laundry you do, the more you save. So if your family is running over 4-5 loads per week, you could really benefit by purchasing a new washer.

Sink faucets and faucet aerators

Water flowing from faucets account for more than 15% of residential indoor water use. WaterSense labeled faucets and accessories can reduce a sink's water flow by 30 - 77%. An average household can save more than 500 gallons of water per year, not to mention, the reduced energy demand for hot water. Faucet aerators cost as little as several dollars, can have a payback of less than a month. Most bathrooms can be outfitted with 0.5 – 1.0 gallon per minute aerators and most kitchens can be outfitted with 1.0 – 1.5 gallon per minute aerators. The typical aerator in most of our homes is rated for 2.2 gallons per minute.

WaterSense Labeled Toilets

WaterSense labeled toilets use 20% less water than the current federal standard while still providing superior performance. The Environmental Protection Agency (EPA) estimates that a family of four that replaces its homes older toilets with WaterSense labeled models will, on average, save more than \$90 per year in reduced water utility bills, and \$2,000 over the lifetime of the toilets. Water Sense Toilets have a flow rate of 1.28 gallons per flush. Water Sense also certifies Dual Flush Toilets.

6.5 Resources

The following are good websites for more information about building science, rating systems, incentives, financing, etc.

Building Science

www.buildingscience.com

ENERGY STAR

www.energystar.gov

The Building Performance Institute

www.bpi.org

Residential Energy Services Network (RESNET)

www.natresnet.org

PA Home Energy

www.pahomeenergy.com

The Inside Story: A Guide to Indoor Air Quality

www.epa.gov/iaq/pubs/insidest.html

EPA WaterSense

www.epa.gov/watersense/

U.S. Department of Energy – Energy Efficiency and Renewable Energy

www.eere.energy.gov

Energy Star Tax Credits

http://www.energystar.gov/index.cfm?c=products.pr_tax_credits

Standards for Rating a Home, Chapter 3

www.natresnet.org/standards/mortgage/default.htm