



Building Performance Institute Accredited Contractors prove the highest level of competency for home energy



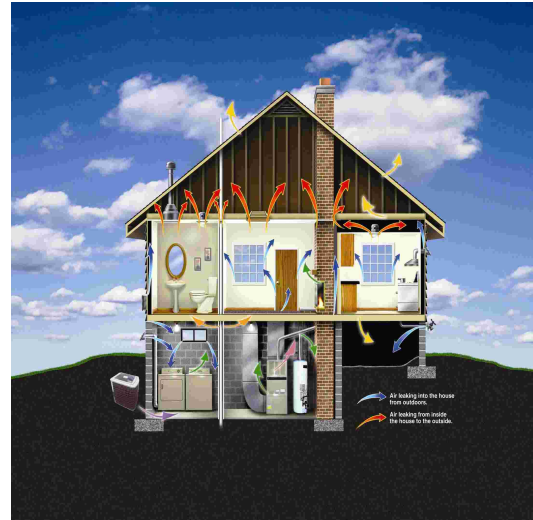
# COMPREHENSIVE HOME ASSESSMENT

Prepared By: **Abc Company**

## About Home Performance with ENERGY STAR®

Homeowners are spending more money than ever to heat and cool their homes. People are not getting the comfort they are paying for. Many homes suffer from cold spots, rooms that are too hot or too cold, ice dams, drafts, building rot, and mold and mildew problems. They may all be common signs that the house is not properly insulated or that the heating system is improperly balanced, or that moist air in the house is not being effectively controlled. Many homes are simply heating the outdoors.

Now there's something you can do about it. Contractors participating in this initiative have successfully completed a comprehensive skills evaluation in home performance diagnostics. Each participating contractor has been accredited by the Building Performance Institute (BPI), a nationally recognized organization for building science technology that sets the standards for assessing and improving the energy performance of homes.



**PREPARED FOR**

*John Doe*  
*555 Main St*  
*Woodbridge, NJ 07095-1104*

## About Your Home's Assessment

Your Home Assessment is customized to identify the particular needs of your home based on our analysis. The information that your Contractor gathered has been entered into a computer software package that helps your Contractor determine the most cost-effective measures you can take to make your house more efficient and comfortable. This report outlines that analysis, prioritizes recommended home repairs, and helps you determine the best improvements for your home.

**BUILDING INFORMATION**

*Conditioned area: 2000 sq.ft.*  
*Heated floors above grade: 1*  
*Building volume: 16000 cu.ft.*

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# YOUR ASSESSMENT

## Blower Door Tests & Air Leakage

Many people assume that a home is built with enough insulation to help keep warm air inside during the winter, and outside in the summer. But the truth is that not all insulation performs the same, and insulation is only half the solution to making sure that your home performs at its best for maximum comfort.

The other important half of the solution to creating a better living environment is reducing uncontrolled air leakage. Typically, as much as 25% of your heating and cooling dollars escape through unseen cracks and gaps in your home, which are usually found in attics, basements, duct systems, and around floors, doors, and windows. If you combine all the holes and gaps in a typical house, it can be like leaving a window or door wide open year-round. In addition, sealing air leaks also helps prevent moisture from entering the attic and walls, which protects your home from structural or insulation damage.

Your accredited Home Performance Contractor has assessed the air loss in your home using a "blower door test," an effective and accurate method to measure and identify areas where air is escaping. You may have seen it being used during the site visit. The test provides some key information about your home. "Shell Leakage" indicates the measurement of air leaking into your home. The "Building Air Tightness Limit" indicates how much air should be entering your home to help ensure that you have sufficient fresh air even when the windows are closed. If you have too much air infiltration, your Contractor will provide recommended measures to seal air leaks. If the test indicates that your house is tight, your Contractor may recommend mechanical ventilation to assist in the removal of potential indoor air pollutants.

## Stopping Air leaks

Once air leaks are detected, a variety of materials are used to eliminate air passages in attics, basements, and living spaces. The materials used in air sealing include sealant foams, rigid baffles, caulking, weather-stripping, and rigid insulation. When leaks are properly sealed, less air escapes into your attic, or passes through walls, floors, and vent stacks, or is drawn into your basement. This procedure also helps prevent moisture problems, including peeling paint and structural damage in walls and building cavities. For this reason, air sealing must accompany most attic insulation work. The table at the right will indicate the amount of air sealing that is recommended for your home.



*Blower Door Test*



*Sealing Air Leaks around Plumbing Chases*

## AIR LEAKAGE RESULTS

*Your building Shell Leakage was determined to be 3800 cfm50. Current industry standards indicate that your Building Air Tightness Limit is 1727 cfm50.*

*Shell Leakage indicates how much air is leaking into your home. If a Blower Door test was performed, the leakage was calculated from measurements taken during this test. If no test was performed, the leakage was estimated based on your building volume and the age and overall condition of your home.*

*The Building Air Tightness limit indicates how much air should be leaking so you have fresh air even when the windows and doors are closed.*

*Given that your leakage is 120% greater than the limit, it is recommended that airsealing be performed to improve the comfort of your home and reduce unnecessary leakage.*

# YOUR ASSESSMENT

## Insulating Your Home for Greater Performance

### Attic Insulation

The recommendations at the right indicate where your house needs insulation upgrades in the attic. Attic insulation decreases your energy usage by slowing heat loss from your living space into the attic, and is most effective when installed in conjunction with air sealing.

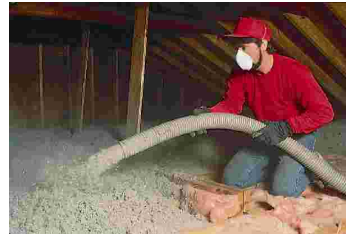
Please see the following page for details on the benefits and technical characteristics of the various types of insulation that may have been recommended.

### Attic Ventilation

Attic ventilation is important for removing moisture from the attic to help prevent damage to insulation and the roof structure. Attic ventilation also may help control ice damming. Building code calls for ventilation to allow moisture that may enter your attic space to dry out and help prevent roof damage.

The ventilation should be balanced, with some vents placed high on the roof structure, with others placed low. Typical high vents are (1) ridge vents - a continuous opening at the peak of a roof, usually covered with shingles to match the roof; and (2) "roof vents" - covered openings in the roof. These come in various sizes. Typical low vents are "soffit vents"-small, screened holes or a continuous opening in the flat soffit area that connects the lower end of the roof to the wall. "Propavents" are rigid foam baffles installed on the inside surface of the roof deck to ensure that soffit vents are not blocked by attic insulation.

Your Contractor may recommend attic ventilation in conjunction with any insulation/air sealing upgrades to prevent structural damage.



Cellulose Insulation



Cellulose Insulation \*

## ATTIC RESULTS

### Existing

One of your attic flats with an area of 2000 sq.ft. has 3" of single fiberglass batting insulation in poor condition. The effective R-Value for this surface is 6.3.

### Proposal

By installing 8" of cellulose on top of the existing insulation, the resulting effective R-Value will be 39.8.

Ventilation in all attic areas is at or above required levels.

# YOUR ASSESSMENT

## Insulating Your Home for Greater Performance

### Insulation-Walls and Floors

The recommendations at the right indicate where your house needs insulation upgrades in basements, crawl spaces, walls, floors and other areas of the home that may have been overlooked during construction or have diminished over time. As with Attic insulation, these insulation recommendations are most effective when installed in conjunction with air sealing.

### Insulation-Benefits and Technical Characteristics

In addition to energy savings benefits, insulation also acts as a sound buffer, so you can enjoy a quieter home.

Below are some technical details on the types of insulation that may have been recommended:

- Cellulose insulation is an excellent insulator made out of recycled newsprint treated with a fire retardant. It provides excellent coverage, filling in gaps often left between insulation batts and ceiling or wall joists.
- Cellulose insulation can also be used to stop air leakage, either outside air coming in, or conditioned air leaking out. To prevent air leakage, the cellulose insulation will be installed at twice the normal density. This procedure, called "dense pack cellulose," is very effective and will not harm walls or ceilings.
- Spray foam insulation can be one of several products, generally polyurethane or polyisocyanurate. These are environmentally safe synthetic foams that fill gaps and holes, have excellent insulation values and block air movement.
- Fiberglass batts are the most common form of insulation. The batts must be installed very carefully to avoid leaving gaps that become leakage paths for air.



*Foam Insulation \**



*Cellulose Insulation*



*Fiberglass Insulation*

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# YOUR ASSESSMENT

## Windows and Doors

It's important to have well-insulated, high performance windows and doors. You'll see and feel the difference through improved comfort, reduced condensation and lower utility costs. Look for the ENERGY STAR to identify the most efficient windows, skylights, and sliding glass doors. A window's insulating ability is measured by its U-value. Since heat flows from warm to cold in the winter, heat flows from your home interior through the windows to the colder exterior. The reverse occurs in the summer. The lower the U-value, the less heat flows through the window. Windows should have a U-value of .35 or lower. Your contractor may recommend that replacement windows have low-emissivity coatings (low-E). These windows transmit virtually the same amount of daylight as uncoated windows, but they help keep the heat in during the winter, and out during the summer. Low-E windows often make a room feel significantly more comfortable.

Doors are measured by R-value, which is the resistance to heat flow. The greater the R-value, the greater the effectiveness in slowing heat loss and maximizing energy efficiency and comfort. Doors should have an R-value of 4 or higher.



*Low-E Windows help keep heat inside during winter, outside in the summer \**

## WINDOWS AND DOORS RESULTS

### WINDOWS

#### Existing

*You have 1 double hung windows with single glazing and wood frames in poor condition. These windows have an effective U-Value of 0.94.*

#### Proposal

*It is recommended that you replace these with windows with an NFRC rated U-Value of 0.30.*



# YOUR ASSESSMENT

## Heating and Cooling Systems

About half of your home's energy costs are for heating and cooling. That's why maximizing its efficiency is important. One way to maximize performance on an existing system is through periodic maintenance, including cleaning and tuning. Oil systems should have maintenance performed annually, while gas-fired systems should be checked and serviced every two years. If your system is more than 10 years old, it may be time to replace the system with a high-efficiency and correctly sized system.

The efficiency of a gas or oil heating system is a measure of how effectively it converts fuel into useful heat. There are two types of efficiency. Overall system efficiency gives you the entire system's efficiency while it is operating, taking in to consideration energy loss through the distribution system. The annual fuel utilization efficiency (AFUE) measures the efficiency of the boiler or furnace, accounting for start-up and cool down, as well as other operating losses that occur in real operating conditions.

New gas-fired heating systems should have an Annual Fuel Utilization Efficiency (AFUE) rating of at least 90%, while the minimum efficiency for oil furnaces and all types of hot water boilers is 84% AFUE. The efficiency of central air conditioning systems and heat pumps is measured by its Seasonal Energy Efficiency Ratio (SEER). The higher the SEER, the greater the efficiency. A SEER of at least 14 is recommended. If you are considering a new system, ask for an ENERGY STAR qualified system for optimum efficiency. If your Contractor recommends that your system be replaced, the assessment summary at the end of this report will include the system's estimated cost, annual savings and payback (the projected number of years it takes for the fuel savings to pay for the system).



*Always look for the ENERGY STAR when buying heating/cooling equipment \**



*Computerized Air Flow Testing*

## HEATING AND COOLING SYSTEM RESULTS

### *Existing System Specifications:*

- \* Location: Basement
- \* System: Furnace: pilot ignition
- \* Fuel: Natural Gas
- \* Manufactured: 1980
- \* Distribution: Regular Velocity
- \* Rated Efficiency: 71%
- \* Overall Efficiency: 71%

### *It is recommended that you:*

- \* Replace this with a Gas Furnace 92% AFUE with a Rated System Efficiency of 92%.

*Based on existing conditions and proposed recommendations, the overall system efficiency will be 92% after the work is performed.*

### *Existing System Specifications:*

- \* Location: Basement
- \* System: Central AC
- \* Fuel: Electric
- \* Manufactured: 1990
- \* Distribution: Regular Velocity
- \* Rated COP: 2.93
- \* Overall COP: 2.77

### *It is recommended that you:*

- \* Replace this with a 14 SEER Central AC with a Rated COP of 3.19

*Based on existing conditions and proposed recommendations, the overall system COP will be 3.19 after the work is performed.*

# YOUR ASSESSMENT

## Forced Air Duct Distribution Systems

Forced air supply and return ducts should be as tight as possible to ensure that the conditioned air is delivered to rooms evenly. Supply duct leaks can contribute to high energy bills and an uncomfortable living space. Return leaks can pull mold, dust and other unwanted particles into your home. To prevent this air leakage through the seams and joints of the ductwork, they should be sealed with mastic including the connections to the registers in the ceilings and floors.

There are several types of duct insulation available. The most common is vinyl-faced fiberglass. This insulation is important for keeping the conditioned air inside the ducts at the desired temperature when being delivered to the rooms in your home. Duct insulation should be cut to fit with all seams properly secured with mechanical fasteners (staples, straps) to achieve the optimum R-value. These measures are especially important when any ductwork is located in attics or crawl spaces. Some areas where ductwork is not accessible for fiberglass and mastic to be applied may still have leaks that require sealing. In these cases, ducts can be sealed by injecting sealant in to the ducts. This method is available from some contractors.



*Contractors use a special mastic & fiberglass perma-sealant to guard against air leaks in the duct system.*

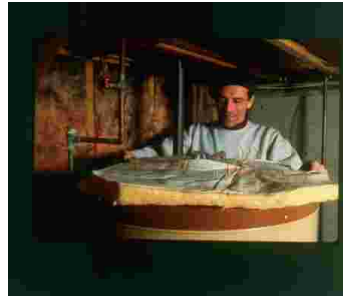


*A properly installed and tested duct system maximizes your heating/cooling system efficiency.*

# YOUR ASSESSMENT

## Water Heaters

At the right you may see recommendations for improving the efficiency of your water heater. Typical recommendations include insulating an existing tank, replacing the existing tank with a more efficient model using the same fuel, or replacing the existing tank with another fuel source, usually natural gas or a heat pump water heater. If your hot water pipes are not insulated in a cold basement, your Home Performance Contractor will often recommend insulating the first six feet of pipe.



Water Heater Insulation

## Combustion Appliance Testing and Performance

Your Building Performance Contractor has been trained to inspect and test combustion appliances such as heating equipment, ovens and water heaters, for proper performance to ensure safe operation. This comprehensive evaluation includes measurement of carbon monoxide (CO) produced by the appliance and testing to ensure that potentially dangerous combustion gases are not introduced into the home. Accredited Home Performance Contractors test for any combustion safety problems before and after performing any energy improvements to your home. The table at the right shows the results for your home expressed in Parts Per Million (PPM). The table also shows the maximum amounts of CO considered acceptable according to EPA guidelines.



Combustion Safety testing on a gas stove.

## WATER HEATER RESULTS

### Existing

Your natural gas tank - standard water heater located in the basement was manufactured in 2003.

### Proposal

No recommendation is being made at this time, but please look for ENERGY STAR rated products if you replace this unit in the future.

## COMBUSTION SAFETY RESULTS

Appliance	CO Readings (PPM)	CO Limit
Gas Oven		100 PPM
Range	n/a	
Oven	n/a	
Water Heater	15	100 PPM
Heating System	25	100 PPM



# YOUR ASSESSMENT

## Appliance Replacement

When it's time to buy or replace your home appliances, be sure to ask for models with the ENERGY STAR® logo. These appliances use up to 50% less energy than conventional models, saving you money on utility bills while reducing air pollution. For example, ENERGY STAR® qualified clothes washers use up to 60% less energy and 36% less water. In one year, that's more water than the average person drinks in a lifetime. Many dishwashers that carry the ENERGY STAR® logo are built with innovative technology to clean better while using less energy and water. And, today's ENERGY STAR® qualified refrigerators use half the energy of a 10-year old conventional refrigerator-for savings of up to \$70 annually.

You'll find the ENERGY STAR® logo on brand name refrigerators, dishwashers, clothes washers, room air conditioners, and home electronics. Please ask your Home Performance Contractor or local retailer for more information.

## Lighting Upgrades

When replacing light bulbs or installing new light fixtures, you'll save time and money when you choose models that have earned the ENERGY STAR® logo. According to the EPA, today's ENERGY STAR® qualified lights equal or surpass the quality of light found in conventional incandescent bulbs, using 75% less energy and lasting 10 times longer. You'll save on energy bills plus the cost and trouble of constantly replacing bulbs.

## NOTES:



*You'll find the ENERGY STAR on brand name appliances and lighting*



*ENERGY STAR qualified lighting uses 75% less energy and lasts 10 times longer than conventional incandescent lighting.*



*ENERGY STAR qualified compact fluorescent light bulbs provide the same quality color and light output as conventional bulbs.*

## APPLIANCE & LIGHTING RESULTS

### OTHER APPLIANCES

*It is recommended that you install/purchase:*

*1 EStar Clothes Washer*

*Please see your contract for details on the specific recommended products for any of these measures.*

### LIGHTING UPGRADES

*It is recommended that you install/purchase the following energy efficient lighting products:*

*4 Bulbs*

*Please see your contract for details on the specific recommended products for any of these measures.*

# YOUR SUMMARY

*This report addresses the key recommendations for improving the comfort, safety and efficiency of your home. The table on the right summarizes the measures by cost, estimated annual savings, and payback. The table at the bottom shows the estimated total annual fuel savings. You should use these tables as a guide for deciding what work you want to have done. Remember, your Home Performance Contractor is ready to complete these measures promptly to help you save.*

## Recommended Measures

Measure	Installed Cost	Estimated Annual Savings	Estimated Payback (years)	SIR
Appliances		\$27.65	32.6	0.34
HVAC Upgrades		\$711.90	9.8	1.42
Attic Insulation, Airsealing		\$758.39	8.3	1.98
Lighting		\$74.77	0.5	9.96
Miscellaneous		\$0.00		0.00
Windows		\$6.49	92.5	0.22
<b>Totals:</b>		<b>\$1,579.19</b>	<b>9.7</b>	<b>1.52</b>

Please see your contract for details on the specific recommended products for any of these measures.



## Estimated Fuel Savings

Fuel Type	Estimated Annual Fuel Savings	Fuel Unit Cost	Estimated Annual Savings
Electric	1210 kWh	\$0.142	\$172.16
Natural Gas	906 therms	\$1.552	\$1,407.03

New Jersey Home Performance with ENERGY STAR<sup>®</sup> Program is brought to you by the New Jersey Board of Public Utilities and New Jersey's Clean Energy Program<sup>™</sup>

# Common House Problems That Cause High Energy Costs and Sacrifice Comfort

Many homes have these problems which may go undetected by the homeowner without proper diagnostic performance testing. The problems are color coded in the diagram below.

## Problem: Inadequate Insulation Levels

- Effects:**
- Warm and cool air escapes, causing heating and cooling equipment to work harder than necessary
  - Ice damming may occur, leading to roof and ceiling leaks
  - Freezing pipes

## Problem: Air Leakage

- Effects:**
- Drafts and cold spots
  - Overworking of heating and cooling equipment
  - Moisture problems leading to peeling, paint, mold, mildew or structural damage in walls and attic
  - Inadequate air exchange causing unhealthy air quality, high humidity or dryness

## Problem: Inefficient Heating Systems

- Effects:**
- Uneven room temperatures due to low air flow
  - High energy costs due to equipment that's older than ten years old with low efficiency ratings
  - Reduced system efficiency due to oversized and/or poorly maintained equipment.

## Problem: Inefficient Central Air Conditioning Systems

- Effects:**
- Refrigerant undercharging or overcharging may lead to premature compressor failure
  - Low air flow may be caused by dirty inside coils, closed registers or inadequate duct sizing
  - Incorrectly wired thermostats and other controls can affect system performance
  - Oversized or improperly serviced equipment reduces efficiency

## Problem: Duct Leakage

- Effects:**
- Uneven distribution of warm or cool air
  - Uncomfortable room temperatures
  - Poor heating and cooling equipment performance

## Problem: Improperly Vented Appliances

- Effects:**
- Dangerous carbon monoxide fumes can enter the living space when gas or oil-fired appliances are not vented properly. This is known as backdrafting and often occurs with poorly vented heating systems, stoves, water heaters, and clothes dryers.

