



ENERGY EFFICIENCY: ENHANCING HOME PERFORMANCE  
PROGRAM **THREE**,  
“Home Performance with ENERGY STAR®”

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**INTRO TEASER (HOST):**

Hi, I'm Mark Mason. Want to improve the energy efficiency of your home, but don't know where to start? Are you looking for a qualified contractor? In the next half hour, we'll talk about the Home Performance with ENERGY STAR® Program and show you where money is leaking out of your home, and identify potentially dangerous conditions. We'll walk through a house with a Building Performance Institute (BPI) Accredited contractor to diagnose problems and provide solutions to save energy and increase comfort. We'll also go over the financial incentives available through the ENERGY STAR® program.

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**Underwriting**

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**HOST (outside house):**

The Home Performance with ENERGY STAR® program is designed to improve the overall efficiency, as well as the health and safety of your home. What happens is, a Building Performance Institute Accredited Contractor will come in and perform a series of tests to determine the energy efficiency of your home – where air might be leaking out, and possible health problems, such as carbon monoxide levels. The process is called a “Comprehensive Home Assessment.” Then they’ll make recommendations for improvements and provide cost estimates to do the improvements while showing you your potential savings. They will even perform the recommended work themselves.

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Even better ... low interest loans and financial incentives are available to many homeowners to make your home improvements even more affordable, but we'll talk more about that coming up a little bit later on. It's time to perform our Comprehensive Home Assessment. This home was built in the latter 70's. The homeowner has lived here for approximately 30 years and has done some home improvements. He thinks the home is pretty energy efficient, but has never put it to the test. Our Building Performance Institute Accredited Contractor is ELLIS GUILLES of TAG Mechanical Systems.

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(Doorbell rings)

**HOMEOWNER:**

Good morning!

**ELLIS GULES: (greet HOMEOWNER at the door):**

Good morning! I understand you have some questions about your home's energy efficiency.

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**HOMEOWNER:**

During the past few winters, I've noticed I've used an awful lot of fuel oil. And with the rising cost of fuel oil in the past few years, it's really starting to put a crunch in my wallet. I hope we can do something about my rising energy costs.

Deleted: I've always used a lot of fuel during the wintertime to heat my home. With the cost of fuel oil increasing so much in the past few years, I've really felt the crunch in my wallet. I'm really interested in reducing my heating costs.

**ELLIS GULES:**

Absolutely, we're going to be able to do a lot about your rising energy costs, and we're going to show you how you can lower your energy bills today.

Deleted: I think we can help with that!

**HOMEOWNER:**

Great!

(Cut to scene with ELLIS GULES and HOMEOWNER at exterior door; he's installed the blower door fan for the blower door test).

**ELLIS GULES:**

The first thing we're going to do is test the envelope of your house for air leaks. The envelope of your house is your roof, your walls, your floors, basically the structure that contains everything inside the house. And what we're going to do is a Blower Door Test. Now a blower door is nothing more than a big fan that's going to suck air out of the house so we're going to accentuate all the air movement through the house. A well sealed and well-insulated house about the same size you're living in should have about 1800 cubic feet per minute when we do this test. Your house has almost 2400 cubic feet of air. That's substantially higher than it should be.

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Deleted: That's the roof

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Deleted: And to do that, we're going to perform a blower door test. It's really just a big fan that sucks all the air out of the house and accentuates the air

**HOMEOWNER:**

That means I'm losing a lot of heat out of my house. No wonder my energy costs are so high.

Deleted: movement so we can see the leaks with a smoke stick. We'll be able to pinpoint the locations where warm air is leaking out of the house and cold air is leaking in. A house this size, well insulated and well sealed, should be about \_\_\_\_ hundred cubic feet per minute. Our meter is telling us that we have \_\_\_\_ hundred. That's considerably more than it should be.

**ELLIS GULES:**

Yes, that's one of the reasons. Let's go find those leaks.

**HOMEOWNER:**

Great!

Deleted: there's a lot of air leakin

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Deleted: Now it's time to find those leaks.

(Up in the attic)

**HOMEOWNER:**

Why are we starting up in the attic?

**ELLIS GULES:**

The attic is a good place to start because this is where a lot of the warm air in the house is going to want to come during the wintertime. And especially in your home, with an uninsulated attic

like this one. There are a lot of places for air to get out of the house. And so, as that warm air goes up and hits the roof, it's going to want to melt any snow that might be up there. That water will come down and start to form in cold places along the roof like the gutters, and you're going to have icicles, and have, eventually, big ice dams, which is bad for your gutters, bad for your roof. One good way to tell whether or not you have air leaks in your attic, is to check around your attic door, and if you happen to have one, an attic hatch. And if you feel any air moving across it at all, you know you've got air leaks in your attic.

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Deleted: This is the place with some of the worst air leaks. Hot air from your heating system rises, comes up to the attic, and it will find every crack or hole there is to escape. In f

Deleted: act, if you have icicles hanging off your roof in the winter, it's a sure sign that warm air is leaking into your attic, warming the underside of your roof. It melts the snow, which runs down the roof and re-freezes as ice dams when it hits a cold section of the roof, such as a gutter

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Deleted: Your attic door is usually a big source of air leaks. The attic door should be sealed tightly. As we can see with our smoke stick, it's not! Take a look at the amount of air coming in. ¶ ¶

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Deleted: You can see some air coming through these. Another place to look for where

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Deleted: air may be coming in, is around things like recessed lights and ceiling fan fixtures. You can see air coming in here as well.

Deleted: me that there's a penetration up here that's not sealed.

Deleted: Another place to check for air infiltration is under

Deleted: Chances are those pipes enter the wall into a chase or cavity that extends all the way up and down the house, bringing in cold air. They're often uninsulated and unsealed

Deleted: Feel around your windows for drafts. We're seeing some air infiltration, which tells me that the seals along this window aren't in particularly good shape. If its just one window, it may not ¶ ... [1]

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Deleted: my biggest source of leakage in this house, and there is a lot of ¶ ... [2]

(Recessed lights, electrical outlets)

### **ELLIS GULES:**

One of the primary places where we can find air leakage into a house is through an exterior wall outlet, like this one. And you'll notice there's a little bit of air movement coming in. We also want to check things like recessed lights. And you'll notice that this one as well has a little bit of air movement through it. We also want to look around ceiling fan fixtures. And again, this one also has some air coming in. This tells us that there are penetrations to the outdoors that aren't well sealed and is bringing air into the house that we don't want coming in.

Other places that we want to look for air leaks in the house is underneath the sinks typically located in your kitchen and bathrooms. You'll notice that the pipes in here usually run up and down the walls in the house, and in many cases, those penetrations will be unsealed, just like this one. We're seeing a little bit of air movement through there, and through the one in the back. Again, we're having air into the house through places we don't want it to come in through.

Your windows, too, are a potential source of air leakage. If you feel around the seals, you'll notice, like this one, there's a fair amount of draft coming through. If it's just one window, it's probably not a problem. But if it's a lot of windows, that adds up and that's costing you a lot of money. You want to consider replacing your windows, your sliding glass doors, and your skylights with ENERGY STAR® rated windows. These will help lower your energy bills. If you notice condensation on the inside of the window during the wintertime, it might mean that your house is actually too tight, and you could be not moving enough moisture out of the house. It doesn't mean that the windows necessarily failed.

One of the biggest offenders in the home is the fireplace. Before you have a Building Performance Institute Accredited Contractor come to your home to do a Comprehensive Home Assessment, make sure that you haven't used your fireplace for at least 24 hours ahead of time, especially if it's wood-burning. I'll bet this is the biggest offender in your home. See, there's a lot of air coming in through this.

We won't leave the cellar out, either. Basement windows, especially single pane ones, can be a big source of air leakage in the house. Usually, though, the rim joist which sits on top of the concrete basement and goes up through the rest of the house is the bigger problem. Newer homes typically have insulation, caulking, or foam, and that helps reduce the air leakage through the rim joist. But older homes, something like this one, have a lot of penetrations through them. And so they're going outside or up into your house and causing lots of air infiltration in your home. This can make your basement very cold during the wintertime, and also cause air drafts

through the rest of your house. Once we come in here and foam, caulk, and insulate that rim joist, your house will be a lot more comfortable.

**HOMEOWNER:**

I never realized that there was so much air leakage in our house.

**ELLIS GUILDS:**

Our next step is checking your exterior walls to see if your insulation is working right. We're going to use what we call a Thermal Imaging Camera. This device tells us what's going on behind your walls, in areas where we can't see. Light areas on the screen tell us that the walls are warm, and that the insulation is working well. Darker areas, it means that the insulation, something's wrong with it, or maybe it's missing completely. And right now we can tell on your walls that there are a lot of dark areas, so there are some real problems here.

**HOMEOWNER:**

That explains why this room is so hot in the summer, and cold in the winter. And there are other areas in the house with the same problem.

(Down in the cellar, by furnace)

**HOMEOWNER:**

This is a forced-hot air furnace. Its 20 years old. It seems to work fine, I get it tuned up every year.

**ELLIS GUILDS:**

Believe it or not, if you replace your furnace with a new ENERGY STAR® model, you'd save up to 30% on your energy bills. When this furnace was first put in, it was probably about 70% efficient. Now, because of its age, it's 60%. That means that out of every dollar you spend on heating, 40 cents of it is going right up the chimney. A new ENERGY STAR® oil furnace would be about 83% efficient, and a gas furnace about 90% efficient. So, changing this out and replacing it with a new high-efficiency ENERGY STAR® model furnace is going to save you a lot of money on your heating bills.

Now we're going to do a visual check of your duct work. The national average is that a duct system leaks up to 25% of the air it's meant to deliver. You can use a compound, like a mastic, mud-like material, to seal all of the joints that you can actually see. You never want to use duct tape. It's not a good sealant. If you want to seal the duct work in areas in your house that you can't get to, like walls and attics, you can use a process called 'Aero-Sealing.' It takes a compound, it aerosolizes it, and blows it down the duct work. It will then adhere to all the cracks, crevices, and holes in your duct work and will do a very good job of effectively sealing your duct system for you. You want to make sure that you do that so you can deliver all of the air that you're supposed to have to your house when you want it, so that you're nice and comfortable in your home.

**HOMEOWNER:**

Deleted: . The biggest offender in the cellar, though, are usually rim joists. That's where your house sits on the concrete cellar foundation. There are often a lot of penetrations here, with wires and pipes that connect to other parts of the house. Sometimes there's insulation or caulking or foam here, but especially on older homes, sometimes there's not. And that can make for a cold basement in the winter.

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Deleted: , which takes a reading of the temperature of your walls. Light areas indicate areas of warmth, and dark areas show places where your insulation isn't working as well as it should. You can see that this wall is not insulated as well as it should.

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Deleted: (are these numbers the same as the ones you see on the label)

Deleted: Brand new, this furnace is 83% efficient

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I never realized I was losing all that heat out of my duct work, before it even reached the rest of the house.

**ELLIS GUILDS:**

Another test we want to perform is to make sure that the gas appliances in the house are drafting properly underneath what we call 'worst case conditions.' We want to make sure that your oven, your stove, your water heater, and your furnace, when they're operating, they're combusting properly, and all the combustion gases are being safely drawn outside of the house. Things like leaky duct work in your home can cause these appliances to backdraft, resulting in carbon monoxide and other combustion gases being brought back into the living space. This is a health and safety concern, and we don't want this happening in your house. Things like leaky duct work can result in these appliances backdrafting, which will bring carbon monoxide into the home. Also, improper or inadequate installation of the ventilation systems for these appliances will also result in a backdraft in the house, and again, carbon monoxide and other combustion gases being brought back into the home. You can see if there's a problem by looking for signs like burn marks around the furnace, or around the water heater diverter opening. This will tell you that there's been a problem and backdraft has been occurring, resulting in carbon monoxide coming into your home. We also want to check for gas leaks around these appliances to make sure that there aren't any leaks in the system, resulting in natural gas coming into the home. Again, this is a health and safety risk, and we want to make sure you don't have this in your home.

So, we're going start out by checking to make sure that your furnace and hot water heater are combusting properly. The first thing we have to do, though, is to make sure there's enough volume so that these appliances can draw air to combust properly. You never want to put a furnace or hot water heater in a closet, it's not going to work properly. We've actually looked at this, and it has an 80,000 BTU per hour input; this one has 40,000 BTUs per hour in input for your water heater, we're going to add those two numbers together, it gives us 120,000 BTUs per hour. We divide that number by 100, which gets us to 120. Then we're going to multiply it by 60. That gives us 6,000. So what it means is, we want to look for about 6,000 cubic feet of volume in order for these appliances to know that they're going to work correctly when we turn them on. Fortunately, we've checked your basement, we've done all the measurements, and you have more than enough volume in your basement, so these products should, in theory, combust properly.

Next, we're going to check the draft on the furnace to make sure it's drafting at least to the minimum standards required by the Building Performance Institute. We've drilled a hole here in the vent system, and we're going to place our tube in here for just a minute to make sure that it's drafting properly. So we'll check the draft .... Now good news, you're drafting at about 4 pascals, which means that your furnace is drafting fine. Now, draft is directly related to outdoor temperature. So the colder it is outside, the better your furnace ought to draft. Which means as the temperatures go up, you're going to have less draft in the house. Which isn't unusual to find that these products won't draft well in the summer time, especially water heaters.

Carbon monoxide is a serious health and safety risk, and you don't want to have any of it in your home. We're going to actually check the level in the furnace. It'll give us an idea of how well

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Deleted: During normal operation, gas stoves, ovens, hot water heaters, and furnaces release combustion gases, like carbon monoxide, through their ventilation systems. Leaky duct work in your home

Deleted: can cause these appliances to "backdraft," which will result in these gases being drawn back into the living space, rather than expelled outdoors where they should be. Improper installation or ventilation can lead to high carbon monoxide levels in the home and increased risk for fire. If you see burn signs on any of these products, it's a sure sign that the unit is not working properly.

Deleted: in the pipes leading from the fuel tank to the unit

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Deleted: to see if they're combusting properly. First of all, we need to be sure that the furnace and hot water heater have the room to combust properly. That's called 'having enough volume in the combustion zone.' You never want to stick your hot water heater or furnace in a closeted area. The furnace is at 80,000 BTUs input, and the hot water heater is at 40,000 BTUs. We add those numbers together to get 120,000 BTUs, divide it by 100 to get 120, then multiply that by 50 to get 6,000. That means we need 6,000 cubic feet

Deleted: units to combust properly. Based on some rough measurements we've done in the basement already, we should be OK.

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Deleted: duct, and put our tube inside the flue, and watch our pressure meter here for a minute or two to see what our draft is. It looks to be about \_\_\_\_\_ pascals. Now, draft is really driven by outdo

Deleted: or temperatures. The colder it is outside, the better gas or oil fired will draft. As outdoor temperatures increase, it gets harder and harder for these appliances to draft properly. So, at least today, this oil-fired furnace is dr{ ... [13]

it's working. If the level's too high, probably going to recommend that it be cleaned if it's between 25 and 100 parts per million. If it's over 100, probably going to want to replace the furnace. So we're going to place this right here in the same place we checked for our draft and check the carbon monoxide levels. So we'll leave it here and see where we're at. ... Actually, you're in pretty good shape. Right now you've got about 25 parts per million in this furnace. So it seems to be working just fine.

**Deleted:** if there's a problem with it, you'll want to get it taken care of right away. This meter reads the levels of carbon monoxide in the air, and as you can see, as the furnace is running, we're getting an elevated level, which means that there is some carbon monoxide being released into the air. What we'd like to see is something below 25 parts per million; that tells us that the appliance is drafting efficiently. If the reading is between 25 and 100, we recommend having the units cleaned and serviced. If it's over 100, we'll probably recommend replacing the unit. And right now we're at \_\_\_ parts per million

**ELLIS GULES: At hot water heater**

How old is your hot water heater?

**HOMEOWNER:**

It's approximately 10 years old.

**ELLIS GULES:**

A water heater that old, we would recommend replacing it with something that is much more efficient. At the bare minimum, we'd recommend using an insulated hot water tank and wrapping it, and or taking and wrapping about 6 feet of insulation right off your hot water pipe.

**Deleted:** (Would we recommend replacing it with a more efficient unit?) At the very least, consider insulating the existing tank and the first six feet of pipe.

**ELLIS GULES:**

Next, we'll check the vent systems to see if they're installed properly. First, we want to make sure we have at least 12 inches off the top of the appliance before making any change in a horizontal direction. We checked this appliance to make sure it was drafting properly, just like we checked your furnace. And BPI standards – Building Performance Institute – requires that all water heaters and furnaces have to be drafting within one minute to be working properly. Signs of corrosion or scorching around the pipes or underneath the diverter on the product can indicate that you've got a draft problem with these appliances. Next, we're going to check for gas leaks, with a very high end meter like this one. These are very sensitive products, and they're going to pick up any gas leak that you might have in your piping.

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**Deleted:** National Field Gas Code indicates that any drafting appliance needs to draft within 15 seconds. Any signs of

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**Deleted:** connections or burn marks on the bottom of the unit are signs that the unit is not drafting properly.

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¶  
Next, we'll check for gas leaks. We use gas meters with a high sensitivity level and check all the joints and gas piping that we can reach.

**ELLIS GULES (2) Gas Leaks (:20) (already shot)**

A good safety check to perform is to look for gas leaks in the house. So we're going to start here, on the load side of the meter, and work our way through the house. We'll take our meter and place it here on the joint, you'll notice we have a gas leak on the very first joint that we inspected. These need to be repaired as quickly as possible. You don't want gas leaks in your home.

(Upstairs, by gas oven)

**ELLIS GULES:**

Up in the kitchen, we're going to perform several of the health and safety checks we do as part of every audit. First, we're going to turn your oven on and bring the temperature up to 500 degrees, and we'll wait five minutes. And then what we're going to do is take the carbon monoxide detector and take the probe and put it in the flue for the oven and check the level of carbon monoxide it's creating. We want to see how many parts per million it's generating. If it's above a certain level, we're going to know it's not working well. Then we'll turn on the gas burners on your stove and make sure they're working as well also. .... Let's put the probe in the flue now

**Deleted:** We're upstairs in the kitchen, and we want to check the gas oven to make sure it's combusting properly. It's another one of the health and safety checks that we do. First, we turn the oven up to 500 degrees, and I'll place our carbon monoxide probe into the flue. We wait about five minutes or till we're pretty confident that the oven has reached 500 degrees.

and check for the parts per million. Yeah, you're in good shape. Your parts per million are really low. You have no problems here with your oven.

Deleted: Our meter indicates that the carbon monoxide level from the oven is at \_\_\_ parts per million, so the oven is operating very, very well. No problem here!

**HOMEOWNER:**

That's great to hear. My wife will be glad to know she can cook safely!

Deleted: /husband

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**HOST:**

Once the Certified Home Assessment is complete, the Building Performance Institute Accredited Contractor will take that information and develop a detailed report, in which all the recommended actions are listed. He'll provide a cost of the work to be done, either an estimate or perhaps a fixed price, and the benefits. Often, if there's quite a bit of work to be done, the homeowner will be offered several different packages at various dollar levels.

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(SIT DOWN SESSION)

**ELLIS GUILDS:**

We examined your home very thoroughly, looking for air leaks, we checked the exterior walls with a thermal imaging camera, and we also tested your combustion appliances, like your water heater, your gas oven and stove, and your furnace to make sure that they were drafting and combusting properly.

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Deleted: performing a number of tests to make sure your gas appliances are drafting and combusting properly.

**HOMEOWNER:**

So, what's the result?

**ELLIS GUILDS:**

Well, we're going to recommend that you actually upgrade your furnace, replace your hot water heater, add some insulation, and get rid of those old, old windows and put in some new ENERGY STAR® windows.

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**HOMEOWNER:**

That sounds expensive. My question is, will it pay off?

**ELLIS GUILDS:**

A lot of customers ask us that very question. Fortunately, we have a piece of software that we use to help us answer that question for you. We've taken all of the information that we've gathered in the field, from all the testing that we did, along with the utility bills that you provided, and entered all that information into the software package. And what it's done, is generated some graphs here for us that tell us just what's going on in the house and what the improvements will be and how much they'll actually cost, and what the paybacks will be. And what we found is, that your home is using about \$3600 a year to heat it. That's a lot of money to be spending just to heat your house. And what we found is, if you add insulation, and do some air sealing, and change out a handful of windows and put in some new ENERGY STAR® windows, you're going to save about \$700 a year just by doing those three things. Next, what we'd recommend is changing out your furnace and putting in a new ENERGY STAR® labeled high-efficiency furnace. Once we've gotten the insulation and the air sealing and the new windows in, that will allow us to put in the right size furnace. You want to make sure you do

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Deleted: We have a software package that we use. We put the information in it about your energy use and the upgrades we plan to do, and see if it makes sense, and what the results are

Deleted: . We've taken your energy use, based on your utility bills, and put it into the computer. It's generated a graph of your energy use this las

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Deleted: that we can drop your heating bills by about 20%. So that's pretty substantial.

these things together. Then finally, you're going to want to replace your hot water heater. It's not drafting well, and it's pretty old. It's probably costing you \$350, maybe \$400 a year simply to heat hot water. If you go to a new high-efficiency hot water heater, you're going to save about a \$100 to \$125 a year, which is going to, again, cut your bills down, and save you some money, and you'll have more hot water when you want it. All the work we're going to do will pay for itself in something less than five years.

**HOMEOWNER:**

Wow, it sounds like a really good idea to go ahead with the improvements.

**TRANSITION TO ELLIS GUILLES IN FURNACE SHOP.**

**ELLIS GUILLES:**

There are several options to choose from if you've been thinking about buying a new heating system. Make sure that you ask for one with the ENERGY STAR® label on it so that you ensure that you get the optimum performance out of your system. You also want to make sure that your heating system is sized properly. Whoever's going to provide you with this system, you need to make sure that they've measured your house and run a load analysis on it so that you get your heating system properly sized. A heating system that is oversized will cycle too often and it's going to cause hot spots and cold spots in your house, and you're generally going to be uncomfortable. If it's not sized large enough, it's going to run too often and this puts undue stress on the product, which will shorten its lifecycle.

You want to make sure that you understand what A.F.U.E. is. A.F.U.E. is Annualized Fuel Utilization Efficiency. This basically tells you just how efficient the product is. What it measures is, whatever heat goes in to the product, how much heat comes out of the product. As an example, if you had a 90% A.F.U.E. furnace, 90% of the heat that goes into it, comes out of it and goes into your home in the way of heat, to make you comfortable. The other 10% escapes from the house through the exhaust gases as part of the combustion cycle for the product.

The most common types of furnaces run on fuel oil, propane, or natural gas. As an example, the furnace I'm standing in front of now is what they call a mid-efficiency furnace. This furnace is 80% A.F.U.E. That's what you'd see on the label. So 80% of the heat that goes into it, comes out of it. 20% escapes up the flue. You can know this by looking at it. It has a metal connector here on the front. This is where the vent is attached to it, to make sure that the combustion gases escape from the unit properly when it's operating. These are the least efficient products that you can currently buy on the market these days, and they will carry an ENERGY STAR® label.

Next, we have a product that is considered a 90 plus percent product. This is what we call a condensing furnace. A condensing furnace brings in air, from either your house or outside, pushes it through its heat exchanger as part of the combustion process, and then we force it out of the system through another piece of plastic pipe that escapes from your house. This system typically has two heat exchangers in it so we can extract enough heat from it that we actually cause the gases to condense. Basically, they become water. And then that water is taken out of your house in the way of condensate that's pumped out. You can usually look and tell if you've

**Deleted:** And once we've done that, that's going to help lower your heating bills even further by probably about another 20%. So far we're up to a 40% savings on your heating bill.

**Deleted:** The red bars represent heating usage month by month. The blue bars are hot water and cooking. Last year you spent almost \$\_\_\_\_, \$\_\_\_\_ for heating alone. After the insulation, air sealing, and window replacement, you'll save almost \$\_\_\_\_. That's about \_\_\_\_%, which is pretty significant

**Deleted:** Overall, you're probably talking about an upwards of 50% reduction in your heating bills, so we're going to cut that down to \$1800 and a

**Deleted:** It will pay itself back in about \_\_\_\_ years.

**Deleted:** If you also replace the furnace with a high efficiency system, you'll save an additional \_\_\_\_%. So that's about \_\_\_\_% overall. And that will pay itself back in \_\_\_\_ years. ¶

¶ Currently, you're spending \$\_\_\_\_ to heat your hot water every year. Replacing your hot water heater with a more efficient one will save you \_\_\_\_%, or about \$\_\_\_\_ per year. That will pay itself back in \_\_\_\_ years. ¶

**Deleted:** consider when choosing a new heating system. If you're considering a new system, ask for one with

**Deleted:** Whomever's

**Deleted:** for optimum efficiency.

**Deleted:** it's

**Deleted:** And make sure its sized right for the square footage of your basement and house. That's really important.

**Deleted:**

**Deleted:** It must be big enough to properly heat the condition

**Deleted:** ed spaces of the home. A heating system that's too big for a home will cycle on and off, giving the home inconsistent temperatures and may lead to higher bills. A heating system that's too small has the tendency to work harder than normal, which hurts the operating lifetime and efficiency of that system.¶

**Deleted:** ¶ Each furnace has an A.F.U.E. rating. That stands for Annual Fuel Utili{... [14]

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got one of these if you happen to have a plastic pipe on one side or on both sides. We'll tell you that you have a condensing furnace.

The one next to this one is what we would consider an ultra-high efficiency condensing furnace. This one is 95% efficient. It will have one or two pieces of plastic pipe attached to it, but what gives it an added advantage is the intelligence inside of it which is built-in through the computer controls. The computer controls on this basically allow you to have two stages of heating, so that you'll be operating on what they call a low-fire or a high fire. So basically, underneath the low fire condition, the furnace is using a lot less energy to produce heat in the house, about 50% of its normal rated output capacity. This is nice during times in the spring or fall when you may need a little heat, but you don't need the whole furnace running. So it helps keep your house a lot more comfortable. Also included in here is a very special kind of motor. The motor in here is what we in the industry would call an electrically commutated motor. Shorthand is ECM. Basically, it runs off of DC voltage. So we take the current and voltage coming into it from your house, we convert it from alternating current to direct current, and then we control the motor. This gives us the ability to do some very nice speed control on the motor, so when it's operating on lower input settings, like you get on low-fire, the fan will also run at a lower setting. When properly designed and installed, this unit will also save you a lot of money on your electricity, upwards of \$100 a year because the motor is so efficient.

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Deleted: (He talks about the different features of new furnaces including forced hot air, boilers, and propane, computer controls, etc. What do we want to say about them: forced hot air, propane, natural gas?) Computer controls, programmable thermostats, high efficiency air filtration, etc.

Deleted: ¶

Hot water boilers, like this little one next to me, distribute heat through your house through pipes, radiators, or baseboard. And you can see these around the edges of your house, typically, they'll either be big cast iron sections or very small, kind of metal covered things that you'll see about six inches off the carpet. This helps you do a pretty good job of heating your house with hot water, and it's distributed pretty cleanly through your house, as long as there are no leaks in the system. If you happen to have an existing water heater in your home, you can integrate this by using an indirect water heater with your boiler. This will help you reduce the cost of both the heating of your house and the heating of your hot water. This particular boiler we have next to us is what's considered a condensing boiler. Just like the furnaces, this one is going to be efficient enough that we're going to create water out of the gases during the combustion cycle. So it's going to have plastic pipe in and out of it, to make sure that it operates properly on the combustion side. If you've got an existing boiler, this thing is probably a lot smaller than anything you're used to seeing at the moment. And it's because this is existing technology coming out of Europe, where their fuel costs are a lot higher than ours, and they're starting to come here to the U.S. It's these kind of products that you want to ask your Building Performance Institute Accredited Contractor about, when you happen to have a hot water heating system in your home.

Deleted: a system of pipes and radiators or baseboard heaters. If you have a boiler system, and a stand alone hot water heater, you can save more money by integrating the two. (showing one) This is an indirect water heater. It's a stainless steel tank with a stainless steel coil inside that gets piped to your heating boiler. The hot water from the boiler heats your domestic hot water. Thus, there's only one piece of equipment that heats both your home and your hot water.

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Deleted: weatherstripping

Deleted: eliminate air infiltration and leaks in attics, basements, and living spaces.

### **ELLIS GUILLES: Air Leak Stoppage (show some of the materials)**

Once air leaks are detected, there are a variety of materials we can use to help stop the infiltration coming into your house through your basement, your attics, and around your windows and doors. One of the items we use is here in my hand. This is a weather-stripping. We'd use this around the door in your home, put it around the top, sides, and bottom. We'd also use a rigid foam insulation. This would primarily be used down around the rim joist but can also be used up in your attics or in other areas in your foundation. We also have caulk, and there's a variety of types. We would normally recommend using a silicon-based caulk. That way it will

last longer. There's also spray foams, expanding, that you can use. A variety of both fully expanding and some minimally expanding. So you have a couple to choose from. And finally there's a material that we call a rain and ice shield. These are typically used around windows when they're installed new, but you can also use them if you're replacing windows, or your existing windows. And this goes over your nailing strip. Any of these items will do a good job of stopping infiltration from coming into your home.

### **ELLIS GUILLES: Insulation (show each type as be-roll either being installed or already installed)**

Several types of insulation are also available. We have Cellulose, which is really nothing more than recycled newspaper that's treated with a fire retardant. It works well in walls, where there might be gaps, or over the top of insulation batts, where we might have voids or other areas where the insulation hasn't come completely together. There are also a variety of Spray Foam insulations. Typically these are referred to as low-density or high-density foams. They're either half-pound or two-pound. Almost all of them on the market these days are very environmentally safe, so you have nothing to worry about using them in your homes. There's also a Rigid board foam, like this one we have here. This can be used anywhere in the house, from the attic to the foundation, and will do a great job, and typically have exceptionally R values, which is really just our way of telling you how good a job they do at stopping heat movement in the house. And finally, we have the most commonly used item in the industry, which is a Fiberglass batt. It's important that these are installed very carefully, though, so that you don't have voids or compression of the batt. Either one of these would substantially de-rate the effective R value of it and make it so it doesn't work quite as well. Any of these insulations will do a good job of helping improve your overall house envelope, and make your home a more comfortable and energy-efficient place to live.

### **HOST: Financial Incentives**

You've decided to go ahead with the recommended home improvements, but how do you pay for it? Low interest loans through New York's Energy Smart program are available to many homeowners. This low interest financing makes your home improvements even more affordable. And homeowners with lower incomes may be eligible for the Assisted Home Performance With ENERGY STAR® Program, which will cover up to 50% of the costs associated with energy efficiency improvements. There is a maximum amount, however. Call 1-877-NY-SMART or log on to getenergysmart.org for more information.

### **HOST: ENERGY STAR® Appliances**

You can also use the low-cost financing to purchase ENERGY STAR® appliances through the Home Performance with ENERGY STAR® program. Appliances with the ENERGY STAR® rating, such as refrigerators, dishwashers, clothes washers, and air conditioners, use up to 50% less energy than conventional models. That will save you money, and help reduce air pollution.

### **HOST: Contract Information**

Once you decide which improvements you want, you'll be presented with a contract. Make sure that all the work you want done is described, and that there is nothing that you don't want done. The contract should include a completion date and terms of payment. Most important, never sign a contract with a contractor who does not perform a Comprehensive Home Assessment.

**Deleted:** They include sealant foams, rigid baffles, caulking, weather-stripping, and foam board insulation

**Deleted:** .

**Deleted:** types

**Deleted:** insulation is made out of recycled newsprint treated with a fire retardant. It's great for filling in gaps left between insulation batts and ceiling or wall joists.

**Deleted:** .

**Deleted:** usually spray polyurethane or spray polyisocyanurate, is environmentally safe and is used to fill gaps and holes. It has excellent insulation values and blocks air movement.

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**Deleted:** insulation

**Deleted:** can be used to insulate almost any part of your home, from the roof down to the foundation. They reduce heat conduction through structural elements, like wood and steel studs.

**Deleted:** s

**Deleted:** are the most common form of insulation. The batts must be installed very carefully to avoid leaving gaps

**Deleted:** ¶ Sealing air leaks and improving insulation will make rooms more comfortable during the cold days of winter and warm days of summer. ¶

And NEVER sign a contract before the contractor has presented you with a work scope that includes details of the work to be performed and the cost of the proposed work. And ask whether the cost is an estimate or a fixed price. If it's a fixed price, it can't be changed without your written permission. Keep in mind that the work scope may change during the course of the job due to the discovery of additional problems or opportunities for other improvements.

Once the work is complete, the home performance contractor is required to repeat the tests performed during the Comprehensive Home Assessment. This process is called a "Pre and Post Testing." Once the work is completed to your satisfaction, you will need to sign a Certificate of Completion. No financing incentives can be processed until the signed Certificate of Completion has been submitted.

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### **HOST OUTRO:**

Today we've shown you that a home is a very complicated place when it comes to energy use, but the Home Performance with ENERGY STAR Program can help put everything in perspective and show you where you'll find the greatest savings. We've also shown you how this program not only lowers your energy bill, but helps improve the safety and comfort of your home. For more information, call 1-877-NY-SMART or log on to [getenergysmart.org](http://getenergysmart.org). Thanks for watching.

### **Underwriting**

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Page 3: [1] Deleted	Administrator	10/12/2007 11:05:00 AM
<p>Feel around your windows for drafts. We're seeing some air infiltration, which tells me that the seals along this window aren't in particularly good shape. If its just one window, it may not be too much of a problem, but if all the windows leak throughout the house, it adds up. Replacing the windows with ENERGY STAR® rated windows, sliding glass doors, and skylights can help you save money on your energy bills. You'll also have reduced condensation on your windows during the winter.</p>		
Page 3: [2] Deleted	Administrator	10/12/2007 11:07:00 AM
<p>my biggest source of leakage in this house, and there is a lot of air coming through here.</p>		
Page 4: [3] Deleted	Administrator	10/12/2007 11:16:00 AM
<p>, which takes a reading of the temperature of your walls. Light areas indicate areas of warmth, and dark areas show places where your insulation isn't working as well as it should. You can see that this wall is not insulated as well as it could be.</p>		
Page 4: [4] Deleted	Administrator	10/12/2007 11:16:00 AM
<p>always cold in the winter, and too warm in the summer.</p>		
Page 4: [5] Deleted	Administrator	10/12/2007 11:20:00 AM
<p>The furnace is a forced hot air heating system. It's</p>		
Page 4: [6] Deleted	Administrator	10/12/2007 11:38:00 AM
<p>is 10 years or older, you can realize up to a 30%</p>		
Page 4: [7] Deleted	Administrator	10/12/2007 11:38:00 AM
<p>replacing it with an Energy Star model.</p>		
Page 4: [8] Deleted	Ryan Moore	7/5/2007 3:29:00 PM
<p>(are these numbers the current ones?)</p>		
Page 4: [9] Deleted	Administrator	10/12/2007 11:39:00 AM
<p>Brand new, this furnace was probably about 70% efficient. Given its age, it's probably running about 60% efficient now, which means that 40 cents of every dollar goes right up the chimney. A new ENERGY STAR® rated forced hot air furnace will have an efficiency rating o</p>		
Page 4: [10] Deleted	Administrator	10/12/2007 11:39:00 AM
<p>f 83% if it's oil-fired and 90% if it uses natural gas. So I would definitely recommend replacing this old furnace with a new, energy efficient model.</p>		
Page 4: [11] Deleted	Administrator	10/12/2007 11:44:00 AM
<p>of your hot air from your furnace will leak out of your duct work when it's not sealed.</p>		
Page 4: [12] Deleted	Administrator	10/12/2007 11:45:00 AM
<p>Joints that you can see can be sealed with a mastic mud-like compound – don't use duct tape. It's not a good sealant. For those joints you can't see, such as the ones in the walls, we use a process known as Aero-Sealing. That process disperses an aerosolized compound into the duct work, and it sticks to all cracks and crevices, effectively sealing them off inside so that air can't get out of the duct work. You'll also want to make sure that all your duct work is connected.</p>		
Page 5: [13] Deleted	Administrator	10/12/2007 1:44:00 PM

or temperatures. The colder it is outside, the better gas or oil fired will draft. As outdoor temperatures increase, it gets harder and harder for these appliances to draft properly. So, at least today, this oil-fired furnace is drafting properly.

Each furnace has an A.F.U.E. rating. That stands for Annual Fuel Utilization Efficiency. Indicated as a percentage, your furnace's AFUE tells you how much energy is being converted to heat. For example, an AFUE of 90 means that 90% of the fuel is being used to warm your home, while the other 10% escapes as exhaust with the combustion gases.