Basic Home Energy Audit
Prepared by Ames Electric Services

The purpose of this information is to help you perform your own basic home energy audit. Improved energy efficiency can your lower bills, increase home comfort, lower utility rates, and conserve environmental resources.

Before You Get Started

Before you get started, we need to qualify a few things. First, understand that this audit information is intended to be general in nature. There are many energy issues in any home. It is almost impossible to address them all.

It is important to take care of what you can. You should only look at making improvements to your home's comfort and efficiency if they make economic sense for your situation.

City of Ames Electric Services makes no guarantee that if you perform your own energy audit that you will save money. Generally, if you reduce the amount of energy you waste, you will reduce your bills.

Reduce Consumption, Increase Efficiency, Source Renewable Energy

Think "Reduce, Reuse, Recycle." The order is important here. Before filling your roof with solar panels, it makes sense to reduce electric consumption as much as possible. Reducing consumption is more cost-effective and environmentally beneficial. Even though renewable energy is less harmful to the environment than burning coal or gas, there are still environmental challenges to mining for metals used to manufacture solar panels, recycling wind turbine blades after they reach their useful life, etc.

Increasing efficiency means reducing the energy we use without reducing the benefit we get from the appliance or machine. Increasing the fuel efficiency of your car means using less gas or electricity and still getting from A to B. This is a win-win. Whenever you're in the market for a new gadget, get familiar with the efficiency rating: mpg_e for electric vehicles, SEER for air conditioners, L/kWh for dehumidifiers, etc. Consider that number in your purchase.

To reduce the size, cost, and impact of our renewable energy systems, we must first reduce our consumption, and then increase efficiency wherever possible.

Audit Layout

The audit covers 13 areas or categories. You may, or may not, have all 13. In each category there is general information, a description of what to look for, and suggestions. At the end of the category there is a check off indicating whether you currently have a particular energy item, and an area for an action.

If you identify an area where you are lacking, jot down an action like, "Call insulation company and get a quote on insulating side walls.", or "Install an insulated jacket on my water heater,", or "Call the Energy Services Coordinator and ask about..." You get the idea. The point is to move forward with making changes that will result in improving your energy efficiency.

The Audit

1. <u>SIDE WALL INSULATION</u>

The first question to ask is, "Do you know if you have side wall insulation?" If you do, there is nothing to do here. Move on to the next item.

If you do not have wall insulation and you are interested in adding some, contact a professional insulation installer (you can find them in the Yellow Pages under insulation), for an estimate. Remember, if you have a choice between attic or wall insulation, insulate your attic. You get more savings.

- Walls without insulation can be insulated in various ways. Possibly, the simplest is to drill holes in the home's siding, and blow insulation through the holes into the wall space. A plug is placed into the hole to prevent weather infiltration.

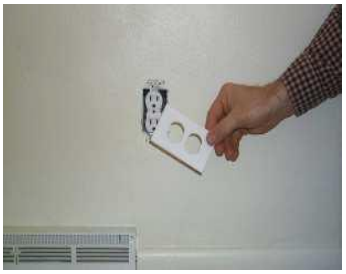
If you don't know if your walls are insulated you may be able to find out by trying a simple test. Take off an exterior wall switch plate (either plug or light switch). If there is a small gap between

the electrical wiring box and the wall, look to see if insulation is visible.

Wall insulation? Y__N__ Action:_____

2. <u>EXTERIOR SWITCH PLATES</u>

While you are evaluating your exterior walls for insulation, you can check for switch plate insulation. Air can leak into and out of a home though switch boxes (plugs, light switches) in your home's outer walls. Switch boxes usually don't seal well. Placing a foam gasket behind the switch cover can help plug this leak. These gaskets may be purchased at a hardware or lumber store.



Switch plate gaskets? Y__N__ Action:_____

3. <u>ATTIC INSULATION</u>

The first question to ask is, "Do you know if you have attic insulation?" If you do, the next question is, "How much is there?" If you have attic insulation, and it is 16" – 18" deep, dry, free of mold, and evenly covering your attic space, there is nothing to do here. Move on to the next item.

If you do not have attic insulation or do not have sufficient insulation, and you are interested in adding some, contact a professional insulation installer for an estimate. Remember, if you have a choice between attic or wall insulation, insulate your attic. Attic insulation upgrades typically achieve more energy savings.

- Attics can be insulated in various ways, and with various materials. Some common types of insulation are fiberglass rolls (batts), fiberglass loose fill, and cellulose loose fill.
- Some insulation materials like cellulose can be dumped into an attic, but more commonly is applied with a blower machine. Blower machines may be rented, however, if you are not comfortable with performing this on your own, contact an insulation professional

If you don't know if your attic is insulated, try to find your access door and check. Use a ruler to measure the depth. If you don't know where your access door is located, or don't have one, contact an insulation professional to check for you.

Remember to insulate and weather-strip your attic access door.

Attic insulation? Y__N__ Action:_____

4. <u>WINDOWS</u>

Windows can be a large energy waster. You want to ensure that you're getting the best performance out of what you have. Because glass has a very low resistance to heat movement, your goal here is to reduce air infiltration. You also want to take advantage of shading at the appropriate times.

Make sure the window seals well. If the window is loose in its track, install some weather stripping to tighten it up.

If you have cracked or missing panes have them replaced.

If you notice cracks between the wall and window molding (or between the window hardware and window molding), apply caulk to plug this leak.

If you have shades, open them on sunny winter days to gain solar heat. Close them on hot sunny days to reduce solar heat gain.

During cold winter weather, use clear plastic window wraps to stop air infiltration. Be sure to apply the wrap so that it covers not only the glass part of your window, but also the junction between the window and wall. Even if you fill any visible cracks around your windows, plastic wrap will further reduce heat transfer if it is applied to cover the area where different building materials meet.

If you are interested in replacing your windows, contact a professional contractor for an estimate. You can look for Energy Star ratings on your windows, and features such as double or triple pane, high quality window frames, low-e glass coatings, argon or krypton gas between window panes, and window pane spacers.

Windows: Good__Fair__Poor__ Action:_____

5. <u>DOORS</u>

Doors can also cause a lot of wasted energy. Some door materials have a low resistance to heat movement. Foam filled steel doors are very efficient. However, hollow wood doors are not. You want to ensure that you're getting the best performance out of what you have. Your goal here is to reduce air infiltration.

Make sure the door seals well. If the door is loose or warped so that you can see daylight around it when it is closed, install some weather stripping to tighten it up.

Make sure the threshold seals the bottom of the door. Again, if you can see daylight under the door when it is closed, replace the threshold.

If you notice cracks between the wall and door frame molding, apply caulk to plug this leak.

If you are interested in replacing your doors, contact a professional contractor for an estimate. You can look for a door with Energy Star rating. Generally, you want to look for solid core door, or one that has insulation inside. Steel doors with magnetic closing strip are a good choice.

Doors: Good__Fair__Poor__Action:_____

6. <u>FIREPLACE</u>

A fireplace provides a large opening for heat to transfer in and out of a home. A fireplace can range from -10% to 10% efficient. They can lose more heat than they produce by taking more heat out of a home via the chimney than they provide. Your goal here is to stop air infiltration.

Make sure the flue damper closes and seals tightly. Keep the damper closed when not using the

fireplace.

Turn your house thermostat down while using your fireplace to save on furnace energy.
If you have a wood-burning fireplace, you may consider installing a sealed gas-burning fireplace. These systems are much more efficient. Contact a professional installer for more information.

Install a tight sealing set of glass doors to stop air movement when not in use.

If you have a fireplace that you don't use, consider adding board insulation to reduce heat loss or gain. Make sure the insulation is removed before any fire is built.

Remember that when a fireplace is in use, even though you may feel warm while near it your furnace can be running more to replace the heat that is being drawn up and out of the home.

Fireplace? Y__N__ Action:_____

7. <u>THERMOSTAT SETTING</u>

Where you set your thermostat setting is a comfort issue. Some of us know that we can save money if we set our thermostat lower in the winter and higher in the summer. Some are willing to pay the higher prices to remain comfortable. Our goal here is to remember there may be other lower cost ways to keep warm or cool.

Turn your thermostat down 5 – 10 degrees in winter when you go to bed at night and use an extra blanket if you need one. Your furnace will have to catch up in the morning, but you will save more than the catch up will cost.

Some people turn down the thermostat at night, close their bedroom doors, and run a space heater to heat only their bedroom overnight. If you have electric resistance heating, this can be a helpful practice! Electric resistance heating is the least efficient kind of heating, and is also the way that most small space heaters work. But be careful! If you have a natural gas furnace or heat pump, it may cost you more to heat your bedroom with a space heater than to maintain the whole house at a more comfortable temperature with your more efficient central heating.

Turn your thermostat down 5 – 10 degrees (as low as 55 deg F) in winter when you are not at home, especially if you'll be gone for a whole weekend or longer. Your furnace will have to catch up when you get home, but you will save more than the catch up will cost.

Consider dressing warmer and using warm slippers in the winter to keep your thermostat set a little bit lower at all times.

If you don't have a programmable thermostat, think about installing one! Thermostat setbacks based on your regular schedule can save a lot, and it's very difficult to remember to setback your thermostat every time you leave the house. Contact a heating and air conditioning professional for more information.

Turn your thermostat up 5 – 10 degrees in summer when you are not at home. Your air conditioner will have to catch up when you get home, but you will save more than the catch up will cost.

Turn your thermostat up 5 – 10 degrees in summer when you are home and use fans to remain cool. Fans use much less energy than your air conditioner. In circumstance that it doesn't affect security, you can open windows at night to cool off your house for the next day.

Try running your air conditioner in the morning for a short time (20 minutes) to clear the home of humidity. This may cause you to run your air conditioner less during the day.

Thermostat setting:_____degrees Action:_____

8. <u>WATER HEATER & WATER TEMPERATURE</u>

A water heater heats and holds water. As heat moves out of the tank, the water is heated to match the thermostat setting. Your goal here is to keep as much heat in the tank as possible.


Newer water heaters have adequate insulation built into them. Older water heaters may benefit from the installation of a water heater insulation jacket. You may also save by installing insulation on the first 6 feet of hot water pipe. These products may be purchased at a hardware or lumber store.

Water temperature is another comfort issue. We may know that we can save money if we turn our water heater temperature down, but, man, a hot shower hits the spot! You can at least turn down your hot water heater to the hottest you actually use it. If it's possible to burn yourself with the hottest water that comes out of your faucet or showerhead, that's probably hotter than you need, and you don't need to be paying for the extra degrees of heat.

Water heater insulation? Y___N___ Action:_____

Water heater temperature setting:_____degrees Action:_____

9. <u>RIM JOIST INSULATION</u>

In homes with basements, the rim joist area can be an energy waster. The wood rim joint has a low resistance to heat movement, and your home can lose energy here. We are talking about the rectangle area between the parallel running floor support boards at the top of the outer basement walls. The goal here is to insulate to reduce this heat movement.

Cut fiberglass roll insulation into small pieces and place them into the rim joist spaces between the floor supports at the top of the outer basement walls.

Rim joist insulation: Y__N__ Action:_____

10. <u>FURNACE FILTERS</u>

A clean furnace filter helps your furnace and air conditioner run more efficiently. A dirty filter makes your system work harder to move warm and cool air around your home.

Replace dirty furnace filters with clean ones on a regular basis. Every 2-3 months may be appropriate unless the weather is very hot or very cold. Then every month may be necessary. This should be done year round.

Check furnace filter? Y__N__ Action:_____

11. <u>CRAWL SPACE / FLOORS</u>

If your home does not have a basement, it may have a crawl space under the floors. The floor is not a good insulator. Warm air will move in and out of the room through the floor into the unconditioned space below. There are two goals here, stop any air infiltration through the floor and corners, and raise the resistance to heat movement with insulation.

If your home has living space above a garage, or a portion of the home is extended over mid-air, the floors here will lose heat energy if they are not insulated and sealed.

The first question to ask is, "Do you know if you have a crawl space, or unconditioned space below a floor?" If you do, ask the next question "Is the floor insulated?" If you have floor insulation, and it is at least 6" deep, there is nothing to do here. Move on to the next item.

If you have a crawl space or a floor over an unconditioned space and do not have floor insulation, and you are interested in adding some, contact a professional insulation installer for an estimate.

- Because the insulation must be attached to the underside of the floor, fiberglass roll insulation is usually used.

If you don't know if you have a floor over an unconditioned space or if it's insulated, try to find your access door and check. The access door may be on the outside of the home. If you don't know where your access door is located, or don't have one, contact an insulation professional to check for you.

Remember to insulate and weather-strip your access door.

Floor insulation? Y__N__ Action:_____

12. <u>DUCTS IN UNCONDITIONED SPACES</u>

If your home has furnace or air conditioner ducting that runs through unconditioned spaces (areas not heated or cooled), you may be reducing the efficiency of your system. Ductwork does not resist heat movement well.

Warm or cool air is created by your furnace or air conditioner and then blown to parts of your home. If the ducts that carry this conditioned air moves through an unconditioned space, it can lose or gain heat (depending on the season). Your furnace or air conditioner must work harder to satisfy your thermostat. Special duct insulation may be purchased at a hardware or lumber store.

Likewise, if the ductwork has cracks or gaps in it, it will lose air. There are two goals here, improve the resistance to heat movement in the ducts, and reduce air movement out of the ductwork. Duct taping the joints and corners of your ductwork can reduce air losses.

Insulate your ductwork that moves through unconditioned space.

Duct tape all cracks and gaps in your ductwork even if not in an unconditioned space.

Ducting in unconditioned space? Y__N__ Action:_____

13. APPLIANCE EFFICIENCY & USAGE

Energy Star now has ratings for washers, dryers, dishwashers, dehumidifiers, freezers, refrigerators, ventilation fans, and more. When you're in the market for a new gadget, look on the Energy Star website to see if Energy Star rates that type of appliance. If not, get familiar with the relevant efficiency rating and consider that number in your purchase.

The common, big energy users (aside from air conditioners, heaters, and water heaters, which we've already discussed) are washers, dryers, refrigerators, TVs and related electronics, and dehumidifiers.

Energy Star rated washing machines not use water and electricity more efficiently, but they also remove more water from your clothes before transferring them to the dryer, which saves energy in the drying process. Washing with cold water saves a lot of energy used by your water heater, and detergents made to clean well in cold temperatures.

Energy Star dryers use about 20% less energy than standard models, according to the Energy Star website, and use sensors to avoid over-drying your clothes. However, hang drying your clothes saves far more energy, and won't cost you more than the price of a drying rack.

If you're trying to decide between a desktop and laptop, the laptop will use less electricity. Newer televisions tend to use very little energy in standby mode, but if you have older TV equipment (older than 2010) or a lot of connected equipment (gaming equipment, sound system, cable box, DVD player, extra monitors, etc), it could be worthwhile to plug them all into a power strip and turn off the whole power strip when you're not using the equipment.

Dehumidifiers are necessary to avoid damage in many basements, but you want to be careful not to leave it on 24/7 if your space doesn't require that much dehumidifying. Look for an Energy Star rated dehumidifier with a humidity sensor that will automatically turn off when the humidity drops to appropriate levels.

Is any of the above info relevant in your home? Y___N____

Action(s):_____

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14. RESULTS

Wow! I'm tired after just writing all of that! Give yourself a pat on the back for investigating all of these improvements you can make to your home and habits to lower your energy bills and reduce your impact on the environment. After investing all that time and energy in these energy efficiency improvements, I encourage you to do just a little more math to calculate your savings. You deserve the sense of accomplishment after all your hard work.

You can start with your electric bill. Compare each month, because remember that the bulk of your consumption is probably cooling (and maybe heating). But every January isn't the same as the last. (Think about January of 2019, uff! You know what I mean?) You can use a metric called degree days to compare polar vortex winters to the "I barely used my parka this year!" winters.

You can find degree days for the last 10 years on the City of Ames website or degreedays.net. Let's say your energy bill shows that you used 800 kWh in June 2018, installed a new, more efficient air conditioner that fall, used 500kWh in June 2019. Did your consumption go down just because the weather wasn't as hot or because your new system really is saving you energy?

We'll take those numbers divided by the cooling degree days (CDD) on the website (311 and 216, respectively) to get 2.57 kWh/CDD and 2.31 kWh/CDD. Your house used less energy per cooling degree day, so your system did work more efficiently in 2019!

Another way to measure your successes is to check out a Watt meter from Electric Services at 502 Carroll Ave. This device allows you to measure the electricity used by an appliance at any moment or over a period of time. You can also check out a Sense Home Energy Monitor, which can track electric usage from your whole house and serve you the data in an app on your smart phone.

Also, be sure to submit rebate claim forms for any qualified energy efficiency purchase you made. Claim forms must be submitted within 6 months of the date on the receipt for the equipment. Check out our website at www.cityofames.org/smartenergy for the current rebate programs.

Feel free to call us at 515.239.5177 or email us at electricrebates@cityofames.org if you have questions about any part of this document. And if you think something is missing or out-of-date, let us know! We constantly improve the resources and services we offer because of input from our knowledgeable and involved customers.