

Use this simple tool to identify ways you can save energy and money at home and also make your home healthier and more comfortable. By making your home more energy efficient, you are also helping to improve the air we breathe and your community to become more sustainable. This tool is intended to serve as a general guide that can be completed and updated incrementally over time. It can help you benchmark existing conditions and measure and track progress as you implement improvement measures over time.

1) LOCATE AIR LEAKS

Potential Benefits: The potential energy savings from reducing drafts in your home could range from 10% to 20% per year. Homes are generally much more comfortable after leaks are sealed.

Assessment: Create a list of obvious air leaks (drafts). Write down your "fix it" strategy for each leak, and use it as the basis for your shopping list of materials and supplies. Line up volunteers and/or contractors if needed to assist you. Prioritize your efforts - tackle the worst leaks first!

Improvement Measures: Add weather-stripping, caulk, sealants to fill gaps around windows, doors, etc. Seal leaks associated with heated components with fireproof, expanding foam caulk or other permanent sealant. Seal any electrical boxes in the ceiling with flexible caulk (from the living area or attic side). Install rubber gaskets behind outlet and switch plates on outside walls. Seal ducts with mastic, butyl tape, foil tape or other heat-approved tapes.

INSPECTION POINTERS

- 1) Check for gaps around chimneys, pipes, chaseways around flues.
- 2) Examine exhaust vents associated with heat producing devices.
- 3) Check the attic hatch to see if it is weather stripped and insulated.
- 4) Check for drafts around windows and doors.
- 5) Check for air infiltration through outlets, fixtures, and switch plates.
- 6) If there's a basement, check if the rim joist and sill plate are caulked and insulated.
- 7) Check recessed light fixtures.

To check for drafts and leaks, close all windows and doors, turn on all bathroom and kitchen exhaust fans, and walk around with a lit stick of incense, passing it about 1 inch over the edges of doors, windows, vents and other suspected potential leak areas. If the smoke is blown into the house or sucked out, there is a leak. You can also look for daylight coming in around doors and window frames, or see if you can rattle them. Check for dirty spots in your insulation, which often indicate holes where air leaks.

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2) EXAMINE WINDOWS

Potential Benefits: Windows provide views, daylighting and ventilation year-round, and solar heating in winter. However, they can be a significant source of heat loss in winter or gain during the summer.

Assessment: Create an inventory of the windows throughout your home. Determine whether each one is double-paned or single-paned. Make sure they are operable. Take into account whether or not storm windows or plastic film is currently utilized or should be in the future. Also see if your windows already have or would benefit from insulating window treatments such as cellular shades.

Improvement Measures: Install storm windows over single-pane windows or replace them with high-performance double-pane windows. Select windows with a U-value of 0.35 or below, and leakage rating of 0.3 cubic feet per minute or less. Apply plastic film to the inside of window frames during cold winter months. Install tight-fitting insulating window shades. Close curtains and shades at night and open them during the day. Clean windows to maximize the amount of natural daylight entering your home.

INSPECTION POINTERS

- 1) Check the fit of windows and doors and the condition of any weather stripping.
- 2) Determine if windows are single or double paned.
- 3) Evaluate window treatments such as curtains, drapes and shades.
- 4) Look at the condition of storm windows and/or plastic film, if utilized.
- 5) Test them to make sure they are fully operational.

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3) INSPECT DUCTWORK	INSPECTION POINTERS
<p>Potential Benefits: You can prevent the loss of up to 60 percent of your heated air before it reaches the register by making sure your ducts are properly insulated if they travel through unheated spaces such as the attic or crawlspace. Ducts that leak heated air into unheated spaces and draw-in unheated air through leaks will cause your furnace to work longer to keep your house comfortable and add hundreds of dollars to heating and cooling bills. Properly installed and maintained ducts can avoid serious, life-threatening carbon monoxide problems.</p>	<ol style="list-style-type: none"> 1) Look for breaks or gaps that cause air leaks, including section joints that have separated. 2) See if ducts are located in unheated areas and, if so, determine if they are insulated. 3) Check to see if a well-sealed vapor barrier exists on the outside of the insulation on cooling ducts to prevent moisture buildup. 4) Also look for a build-up of dust and grime, which can restrict air flow and decrease efficiency.
<p>Assessment: Create an inventory of your home's ductwork. Identify heating and cooling ducts that are located in conditioned areas. Determine whether ductwork that is located in unconditioned attic, basement and crawlspace areas is insulated.</p>	
<p>Improvement Measures: Insulating, air-sealing and placing ducts within the conditioned space of your home will reduce energy losses. Although minor duct repairs are easy to do, ducts in unconditioned spaces should be sealed and insulated by qualified professionals. Use mastic, butyl tape, foil tape or other heat-approved tape for sealing ducts.</p> <p>Guidance on insulating heating and cooling ductwork is readily available on-line - for example, see https://www.nrel.gov/docs/fy12osti/53494.pdf</p> <p>Air duct cleaning can improve system performance and efficiency. It can also reduce recirculation of allergens and irritants so that residents can breathe easier.</p>	
<p>NOTES:</p>	
4) CHECK INSULATION	INSPECTION POINTERS
<p>Potential Benefits: Only 20 percent of homes built before 1980 are properly insulated. Insulation creates a more uniform temperature and increases comfort. It also muffles noise from outside the home. Heat loss will vary depending on the areas that are insulated, and the insulation levels and types used. Minimum standards for insulation are climate-specific and designed to make homes more energy efficient and save on energy costs. You can increase the comfort of your home while reducing heating and cooling needs by up to 30% by investing in proper insulation and sealing leaks.</p>	<ol style="list-style-type: none"> 1) See if there is a vapor barrier under the insulation in the attic (tar paper, Kraft paper or plastic sheet). If there's no barrier, consider painting the interior ceilings with vapor barrier paint. This reduces the amount of water vapor that can pass through the ceiling, improving the effectiveness of insulation. 2) Make sure the entire attic floor, including the attic door, is covered with insulation. Somerset County is in IECC Climate Zone 5, for which R-38 - R 49 is recommended for attic/ceiling areas. 3) Select an exterior wall and cut the power to an electric outlet. Remove the cover plate and probe into the wall with a wooden skewer, crochet hook or similar item to retrieve any small bits of insulation. If you encounter a slight resistance, insulation is probably present. (In Somerset County, R-13 to R-18 is recommended for wall areas). 4) Check the basement or crawlspace to see if there is insulation under the living area flooring (R-11 to R-25 is recommended for floor & crawl space). 5) If the sub-space or basement is intentionally heated/cooled, the subspace perimeter rather than the living space floor should be insulated, for which R-11 is recommended.
<p>Assessment: Determine if your home has insulation in the attic, exterior walls and/or floor and its thickness. There are many types, including fiberglass, recycled cloth fiber, spray foam, etc... Use the pointers to the right to determine whether the insulation you have is adequate and how much additional insulation you may need.</p>	
<p>Improvement Measures: Add or replace insulation with a product specifically designed for each area type/space/surface. Take advantage of new construction and major remodeling projects, which are the perfect opportunities to enhance insulation. Depending on the area of the home and type of insulation, it can be installed by you or a professional. Take appropriate safety precautions during installation. Adding insulation to the attic is generally easier and more cost effective compared to other insulation projects.</p> <p>Guidance on installing insulation in homes is readily available on-line, see: https://insulationinstitute.org/im-a-building-or-facility-professional/residential/installation-guidance-2/attics-and-ceilings-2/</p>	<p><u>Insulation Type: R-Value per Inch (U.S. Dept. of Energy):</u></p> <ul style="list-style-type: none"> Fiberglass (loose) 2.2 – 2.9 Fiberglass (batts) 2.9 – 3.8 Cellulose (loose) 3.1 – 3.8 Stone Wool (loose) 2.2 – 3.3 Stone Wool (batts) 3.3 – 4.2 Cotton (batts) 3.0 – 3.7 Cementitious (foam) 2.0 – 3.9 Polycynene (foam) 3.6 – 4.3 Phenolic (foam) 4.4 – 8.2 Polyisocyanurate (foam) 5.6 – 8.0 Polyurethane (foam) 5.6 – 8.0

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5) INSPECT HEATING EQUIPMENT	INSPECTION POINTERS
<p>Potential Benefits: Using appropriately-sized, high-efficiency, clean energy heating systems can greatly reduce both energy consumption and cost, especially if the existing equipment is in poor condition. Upgraded, properly maintained heating systems that operate with clean, renewable power sources can cut energy bills and pollution output in half when combined with appropriate insulation and air sealing.</p> <p>Assessment: Key indicators to consider when examining your heating system for potential efficiency and cost-saving measures are its age and its power source. Heat pumps are among the cleanest and most cost-effective methods for heating (and cooling) homes if you are considering fuel-switching. For more information about this technology, see: https://www.synapse-energy.com/about-us/blog/switch-savings-heat-pump-cost-effectiveness-study.</p> <p>Improvement Measures: Replace old systems (over 15 years old), especially those fueled by oil, coal, wood and other combustibles that generate pollution. The minimum Annual Fuel Utilization Efficiency rating for furnaces is 78 percent, but ENERGY STAR-rated furnaces can exceed 90 percent. Systems should be inspected annually.</p> <p>In general, air filters should be replaced monthly when furnaces are in use. Clean warm-air registers, baseboard heaters and radiators regularly. Bleed trapped air from hot water radiators once or twice a season. Place heat reflectors between exterior walls and radiators.</p>	<ol style="list-style-type: none"> 1) Examine the heating system - its age and general condition, and the age and condition of furnace filters. 2) Review the information about your heating system to ensure proper operation and maintenance. It should be secured to the unit and is also in the Owner's Manual. 2) Make sure furniture and draperies are not blocking heating outlets or cold air returns.
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6) CHECK THE FIREPLACE AND WOOD-BURNING STOVE	INSPECTION POINTERS
<p>Potential Benefits: Fireplaces are aesthetic features but are inefficient and should be used sparingly. A primary benefit of having a fireplace or wood-burning stove is the warmth they provide if there is a power outage during winter months. They can also be used for cooking during power outages. When the home is on a heavily wooded property, wood supply can be sustainably managed.</p> <p>Assessment: If your home includes these features, create a list that you can use to track their operational status and condition and that can serve as a maintenance schedule. Consider how often you use these features. If you have not used a fireplace in a very long time, and do not foresee using it in the future, consider sealing it to eliminate the loss of conditioned air from your home. Make sure you have properly functioning and located smoke-detectors.</p> <p>Improvement Measures: A chimney is designed specifically to allow the smoke from your fireplace to escape. Until you close the flue damper, warm/cool air escapes from your home, so it is important the flue is working properly. Burn only untreated/unpainted, seasoned (dry) wood. Clean your chimney/stove-pipe annually. Replace the screen in front of the fireplace with tempered glass doors and keep doors closed while a fire is burning. Install a fireplace insert (double-wall unit with a built-in circulating fan). Old wood stoves should be replaced with more efficient, right-sized models that are strategically located to maximize their potential as a supplemental (and/or emergency back-up) heating source and ensure safety. Save energy and money by sealing fireplaces that are not used (see https://dengarden.com/home-improvement/How-to-seal-an-unused-fireplace-and-save-on-heating-bills).</p>	<ol style="list-style-type: none"> 1) Examine the damper to see if it fits and works. The flue damper should be closed when the fireplace is not in use. 2) Check the fit of glass doors and caulking if present. 3) Determine if a fireplace insert is in use. 4) Determine the age and condition of the wood-burning stove or fireplace insert if present. 5) Check for soot and creosote build-up and the overall condition of chimneys and flue-pipes.
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7) EXAMINE THE HOT WATER HEATER	INSPECTION POINTERS
<p>Potential Benefits: Water heating is the third largest energy expense in your home, accounting for about 16 percent of your utility bill.</p> <p>Assessment: Determine the age of your water heater and the temperature it is set at. Check to see if your hot water storage tank is insulated or whether you have a tankless water heater.</p> <p>Improvement Measures: Lower the thermostat on your hot water heater to 120 degrees F. Insulate your hot water storage tank & protect water pipes and drains in unheated spaces from freezing during the winter by wrapping electric heating tape on pipes. Repair leaky faucets and install aerating, low-flow showerheads. Drain a quart of water from your water tank every 3 months to remove sediment that impedes heat transfer and lowers efficiency. If your water heater is more than 15 years old, consider replacing it with an ENERGY STAR-rated model, perhaps a tankless version. An added benefit of heat-pump (geothermal) heating and cooling systems is they also provide hot water. Natural gas water heaters are generally cost-effective if natural gas is already available, but ensure that air intakes are not obstructed. If you are in the market for a new clothes washer and/or dishwasher, consider buying new ENERGY STAR-rated models to reduce hot water use.</p>	<ol style="list-style-type: none"> 1) Check the temperature setting. 2) Look for insulation on the water heater and hot water pipes. 3) Determine the general condition and age of your hot water heater. 4) Check for leaks.
<p>NOTES:</p>	
8) ENSURE PROPER VENTILATION AND INDOOR AIR QUALITY	INSPECTION POINTERS
<p>Potential Benefits: Fuel-burning heating systems and appliances such as stoves must have an adequate air supply in order to protect residents from backdrafts, which can cause carbon monoxide and other combustion by-products to build up and create a very dangerous and unhealthy condition within the home. Ventilation is also needed to control moisture and prevent mold growth and to prevent the build-up of indoor air pollutants such as formaldehyde, volatile organic compounds and radon. Ventilation for cooling is the least expensive and most energy-efficient way to cool buildings, and works best when combined with spot-ventilation techniques (such as fans of various types) to avoid heat build-up.</p> <p>Assessment: Verify that carbon monoxide and smoke detectors are properly installed and functioning, heating and cooling system filters have been changed on-schedule and windows are fully operational.</p> <p>Having positive air flow is important in all homes and is necessary to ensure air indoor quality. The current U.S. ventilation standard ANSI/ASHRAE Standard 62.1-2016 provides minimum ventilation rates for different types of buildings. If you have a "tight" highly efficient home, the best way to determine the adequacy of your ventilation is by hiring a professional.</p> <p>One CO Detector for each floor of your home is recommended. They should be placed five feet from the ground near sleeping areas.</p> <p>Improvement Measures: Attic vents can be installed outside the soffit along the entire ceiling cavity to help ensure proper airflow to make a home more comfortable and energy efficient. When adding or replacing exhaust fans, choose ENERGY STAR-rated models. Consider using ENERGY STAR-rated window and whole-house fans to improve ventilation during warmer weather when air-conditioning systems are not in use. In highly efficient "tight" homes, a continuous source of fresh filtered air and moisture control is critical. These homes benefit from heat recovery or energy recovery ventilation systems since it costs less to mechanically ventilate and air-seal homes than it does to heat excess amounts of infiltration air. Add CO detectors as needed.</p>	<ol style="list-style-type: none"> 1) Look for signs of moisture damage in the attic, basement and living area. If present, this could be a sign of inadequate ventilation or the absence of vapor barriers. 2) Check carbon monoxide (CO) detectors to make sure they are fully functioning, optimally located and properly installed. Add CO detectors as a safety measure if they are not already present. 3) Make sure ductwork is functioning properly. 4) Ensure intakes are not obstructed and air filters are up-to-date. 5) Test windows to make sure they are fully operational.
<p>NOTES:</p>	

9) INSPECT COOLING EQUIPMENT	INSPECTION POINTERS
<p>Potential Benefits: A properly sized room air conditioner or central air system will work more efficiently, maintain a more constant room temperature and remove excess humidity than those that are oversized. Landscaping is a beautiful way to keep homes cool in summer and reduce energy bills. Studies show that summer daytime air temperatures are 3 to 5 degrees cooler in tree-shaded neighborhoods as compared to treeless areas in the same community.</p>	<ol style="list-style-type: none"> 1) If there are window or wall air conditioners, look to see if they have a cover, and whether the space around them is sealed. 2) Check to see if the air conditioning unit is located in the sun and the degree to which the home is shaded during summer. 3) Determine the age and condition of air conditioning units and fans.
<p>Assessment: Determine the age and condition of your air conditioner(s) and their maintenance status. If you have a centralized air conditioning system, or individual window- or wall-mounted units, regular maintenance is required for them to function efficiently. At least once each season, clean and level your outdoor A/C condenser unit and evaporator coil. Also check for and clear clogs in the condensation drain line and change the blower filter. Examine window- or wall-mounted air conditioners to make sure they are right-sized for the room and properly installed, and change the air filter monthly when in use. Clean the condenser coils and water pan each season and monitor for frost build-up.</p>	
<p>Improvement Measures: Consider replacing air conditioners that are over 15 years old with an Energy Star-Rated model. The minimum Seasonal Energy Efficiency Ratio is 13. Energy Star-Rated models exceed this minimum. Consider installing an Energy Star-rated whole-house fan. These are more cost-effective than air conditioning when the outside air is cooler than inside. Fans can be used as a cost-effective way to spread cooled air within your home. Plant shade trees and shrubs to shade air conditioning units, which can reduce electricity use by up to 10%. Carefully placed shade trees can reduce overall heating- and cooling-related energy costs by up to 25 percent. Replace the seal around window or wall air conditioners with proper insulation.</p>	
<p>NOTES:</p>	
10) EVALUATE THERMOSTAT SETTINGS	INSPECTION POINTERS
<p>Potential Benefits: You can save as much as 10% a year on your heating and cooling bills by turning your thermostat back 10 - 15 percent for 8 hours, which can be accomplished automatically by using a programmable thermostat. Zoned systems can save up to 30% on a typical home heating and cooling bill according to the U.S. Department of Energy.</p>	<ol style="list-style-type: none"> 1) Evaluate the type of thermostat(s) that have been installed and their temperature settings. 2) Determine if they are located and functioning properly.
<p>Assessment: Determine the type of thermostats you have and if you have a zoned heating and cooling system. Each zone would be controlled by a separate thermostat.</p>	
<p>Improvement Measures: Set your thermostat(s) as low as is comfortable in the winter and as high as is comfortable in the summer. Consider installing a programmable, ENERGY STAR-rated thermostat or smart home system and app to adjust the times you turn on heat and cooling systems based on when your home is occupied. Consider installing a zoned heating and cooling system that breaks your home into different areas or "zones" that are controlled by separate thermostats as a strategy for reducing energy use for heating/cooling unoccupied areas. Improperly located thermostats can drive-up heating and cooling costs. Thermostats should be placed in the center of your home or zone if applicable. They should be located on an interior wall, away from direct sunlight, air vents, kitchen stove/oven, windows and doors. Wireless thermostats are a great option when relocating thermostats is appropriate.</p>	
<p>NOTES:</p>	

11) ADDRESS LIGHTING	INSPECTION POINTERS
<p>Potential Benefits: Energy for lighting accounts for about 10% of the average household electric bill. Rebates and other incentives are available for purchasing energy-efficient lighting (see http://njcleanenergy.com/main/rebates-and-promotions/rebates-and-promotions). LED bulbs last much longer than other bulb types, which is a plus when lights are hard-to-reach. LEDs also generate considerably less heat, which is an advantage during summertime, and can include blue-light filters that protect vision.</p>	<p>Evaluate the age and condition of all light fixtures while assessing the bulbs they contain.</p>
<p>Assessment: Examine all light fixtures in each room of your home. Switch-out incandescent bulbs, Compact Florescent Light (CFL) bulbs and other bulb types with Light Emitting Diode (LED) bulbs.</p>	<p>Pointers for choosing replacement bulbs:</p>
<p>Improvement Measures: Light-emitting diodes (LEDs) are the most efficient and cost-effective choice today for replacing inefficient incandescent and less-efficient CFL bulbs. They come in a range of styles, levels of brightness and warm/cool colors. They fit most lighting fixtures. Access to natural lighting from windows, and the use of controls such as smart home apps, occupancy sensors, dimmers and/or timers can be used to in conjunction with high-efficiency bulbs to reduce lighting use and associated energy costs. Ensure safety by replacing damaged light fixtures.</p>	<p>To replace a 100 (W) watt incandescent bulb, look for a LED bulb that gives you about 1600 lumens. If you want something dimmer, go for fewer lumens; if you prefer brighter light, choose more lumens. A 75W bulb equals about 1100 lumens, a 60 W bulb equals about 800 lumens, and a 40W bulb equals about 450 lumens. Fixtures with dimmers require dimmer-compatible LEDs. Be sure to recycle old CFLs, which contain mercury.</p>
<p>NOTES:</p>	
12) CONSIDER APPLIANCES AND ELECTRONICS	INSPECTION POINTERS
<p>Potential Benefits: Appliances account for about 20% of your household's energy consumption. Roughly 50 devices and appliances in the typical American household are always drawing power, even when they appear to be off. About a quarter of all residential energy consumption is used on devices in idle power mode. The average household can reduce energy consumption and earn tax credits by switching to ENERGY STAR-rated appliances.</p>	<p>1) Include home office equipment and electronics such as computers and fax machines in your inventory.</p>
<p>Assessment: Create a room-by-room inventory of all the appliances you have in your home, specifying their age and whether or not they are ENERGY STAR-rated. Distinguish between those that are plugged-in all the time (such as refrigerators, stoves, washers, driers, TVs and air conditioners) and those that are used intermittently and are un-plugged most of the time (mixers, toasters, hairdryers, cell phones, computers, etc.).</p>	<p>2) Carefully inventory appliances in kitchen, bath and laundry areas.</p> <p>3) Refer to the Energy Guide label on refrigerators and other major appliances and look for an ENERGY STAR label.</p>
<p>Improvement Measures: Substantial energy and cost savings can be achieved simply by unplugging appliances that are used infrequently. Another simple strategy is to use a power strip to group appliances that can be turned off at the same time. There are now several different types of "Smart Power Strips" that are designed to monitor and control power to each outlet in the strip to improve energy efficiency, establish time-of-use and that can be remote-controlled. Time-of-use meters may enable cost savings for off-peak energy usage. Keep in mind that lots of traditional appliances and devices such as televisions and lap-tops are now connected to the internet and may draw power all the time. Replace old appliances and devices with ENERGY-STAR-rated models. For example, replacing a dishwasher manufactured before 1994 with a new ENERGY STAR-rated model can save you more than \$25 per year in energy costs. Smart home apps are another great way to manage appliances remotely. Use heavy appliances such as washers, driers and dishwashers during off-peak hours to save on energy costs.</p>	<p>4) Consider both the purchase price and operating costs when purchasing appliances in the future. Choose ENERGY STAR-rated models whenever possible.</p> <p>5) Evaluate use of power strips.</p>
<p>NOTES:</p>	

DATE OF ASSESSMENT COMPLETION (MONTH/YEAR):

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There are potentially more ways to make your home more energy efficient. Obtain a professional home energy audit to get a detailed assessment of your home's current energy consumption and set of recommended energy efficiency measures that you can implement. For more information, please visit the NJ Clean Energy Program website: <http://njcleanenergy.com/residential/programs/home-performance-energy-star/what-expect-home-energy-assessment>.

To learn about innovative home energy conservation and efficiency initiatives, see:

ENERGY STAR Residential Construction Program: https://www.energystar.gov/partner_resources/residential_new/about

LEED-Certification for Residential: <https://new.usgbc.org/leed/rating-systems/residential>

Zero Energy Homes: <https://zeroenergyproject.org/>

High Performance Homes: <https://www.hphpa.com/>

Sources: <https://www.energy.gov/energysaver/home-energy-audits/do-it-yourself-home-energy-audits>

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "Energy Saver\$: Tips on Saving Energy and Money at Home", 2005

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