



# Phila. Hub News Supplement— Energy Conservation Articles from Past Newsletters



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## Energy Saving Tips



### Energy Action Plan

In FY 02, HUD adopted a 21-point, Department-wide Energy Action Plan in support of the President Bush's National Energy Policy.



The Plan is aimed at upgrading the energy efficiency of existing housing using an established inventory of proven energy-efficient products and appliances. This will be accomplished through consumer education and outreach, interagency cooperation, market-based incentives, and public-private partnerships.

The success of this effort will have a great impact on HUD which spends \$4 billion each year on utility allowances, housing assistance payments, and operating grants. Reducing HUD's energy bills by just 5% could yield a savings of \$2 billion over the next 10 years.

To promote this effort, many HUD offices will be scheduling Energy Conferences throughout the year. In addition, our office has compiled, in this special supplement, all of the articles that have been published on this topic in the past 38 issues of Philadelphia Multifamily Hub News.

### Reducing Energy Bills

Saving money on your energy bills depends on four major factors: 1. Energy efficiency of your systems, 2. Managing system operations, 3. Simple systems maintenance, and 4. Age and condition of your building.

One of the easiest ways to save money on your energy bills is to purchase a high efficiency heating and cooling system. Keep in mind that even the least efficient systems currently allowed by the federal government will always cost less to operate than systems installed over 10 years ago. In purchasing one, it is important to look for the right balance between the initial cost and long-term savings.

No matter how efficient your system is, the way that you manage its operation can affect your heating and cooling costs. Things like "set back" thermostats, programmable thermostats, and zoning systems can be of significant value in achieving savings.

Another key to savings is to change furnace or fan coil filters frequently, and to clean outdoor coils. Also, particularly with older less energy efficient buildings, you should make sure that they are adequately insulated, have storm windows and doors (if appropriate), and have good seals around windows, doors, and electrical outlets.

An often overlooked area of savings is the laundry room. Having an energy-efficient common laundry room is a sound strategy. Studies have shown that in-unit washing machines use 3.0 times more water than common area machines. In-unit machines tend to drain more water and electricity resources because tenants are more likely to do smaller, more frequent wash loads—resulting in soaring utility bills.

When you purchase appliances or building materials, look for ones that have earned the ENERGY STAR label. Some examples of the potential savings are: ceiling fans—10%, vent fans—65%, central air conditioners—20%, room air conditioners—10%, windows—10%, front-load washers, etc. To learn more about ENERGY STAR, visit its website at: [www.energystar.gov](http://www.energystar.gov).

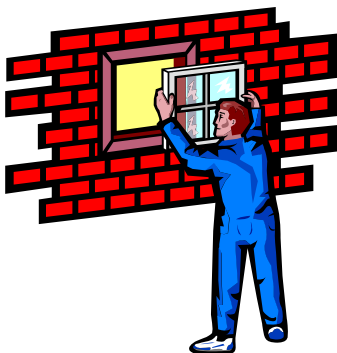
**New EPA Policy on Sub-metered Apt. Buildings**

Under new guidance issued by the Environmental Protection Agency, (see December 23,2004 Federal Register) projects that sub-meter and bill tenants for water usage, will not have to comply with the Safe Drinking Water Act (SDWA) that applies to public water systems.

In response to Congressional requests, the EPA reversed its position and stated that an apartment owner who individually meters units or bills separately for water is not selling water and, as a result, is not a fully regulated water system.

The National Multi Housing Council and the national Apartment Association had spoken out against the original ruling because it discouraged sub-metering and water conservation.

**Tips for Leaking Windows**



Sealant failures are the prime cause of leaking windows. Such failures may be influenced by normal weathering, improper design (i.e., interface with facade components), or poor installation.

If you are faced with such a problem, consider the following tips, as set forth in the October 2004 issue of

Buildings before you embark on an expensive repair or replacement program:

- \*Maintain accurate leakage records, including the date, quantity, and location, as well as the weather conditions prior to the observed leakage.
- \*Do not authorize window system repairs without knowledge about the probable cause of the leakage.
- \*Engage a facade consultant experienced in the diagnosis of window systems to investigate leakage problems and outline repair options.
- \*Do not allow indiscriminate application of sealant as a shotgun approach to address leakage.
- \*Insure that any sealant repair/replacement program contains essential elements of proper sealant joint design and installation.

**Self-Cleaning Windows**

Several major international glass manufacturers are now producing “self-cleaning” window glass. The exterior panes have a special self-cleaning coating that is actually invisible and is durable as the window glass surface itself.



The coating self-cleans the window by two continuous processes. Safe chemicals in the glass surface create a photocatalytic process when sunlight (especially ultraviolet rays) strikes the glass. This process breaks down and disintegrates organic dirt, which is the majority of dirt on windows.

The special surface also has a hydrophilic property that causes water to sheet and flow down the glass instead of forming beads when it rains. The glass can be cleaned by simple rain water or by a garden hose. Because of the sheeting action, you can see outdoors during a heavy rain almost as well when the weather outside is dry.

Another benefit is that the treated glass is energy efficient because, during the winter, the clean glass allows more solar heat to enter the interior living space.

**Window Film**

An often overlooked way to save energy is to install window film. This simple measure can reduce the amount of solar heat in a building by as much as 65% (from 175 BTU/h-ft<sup>2</sup> to 65 BTU/h-ft<sup>2</sup>). This can account for one-third of a building’s cooling load, depending on its location. Single-pane, tinted glass is the most common measure for existing buildings. Most window film carries a 10 year manufacturer’s warranty, and the installed cost of \$3 to \$4 per sq. ft., commonly represents a 40% return on the initial investment!



### Exterior House Coatings

According to Textured Coatings of America, there is a new exterior coating that can make exterior walls of residential buildings virtually impregnable to water and high winds.

These coatings, which contain heavy concentrations of high-strength resins, have been used on airport control towers, bridges, and schools for years.



Unlike paint, the dense epoxy coatings add rigidity to exterior surfaces. Of particular benefit from the coating is stucco walls which tend to absorb water and allow moisture to penetrate the surface, often creating a mildew problem. The effect of the product is like coating a building in breathable plastic. In addition, the product reflects the sun's rays and results in lower cooling expenses.

Although the coatings look like paint (and come in dozens of colors), they require specialized sprayers and professional coating techniques.

More details can be obtained from the Textured Coatings of America's website at: [www.texcote.com](http://www.texcote.com).

### Energy Saving Ideas

As part of its "Smart Energy Campaign," the U.S. Department of Energy has introduced a web site, [www.energysavers.gov](http://www.energysavers.gov) that includes a virtual tour of a house to determine ways to save energy and information for children to get them to participate in conservation efforts.



Another good source for conservation tips is the non-profit Alliance to Save Energy. It offers both a website- [www.ase.org](http://www.ase.org)- and a free booklet, "Power\$mart: Easy Tips to Save Money and the Planet." The booklet can be obtained by calling 1-800-878-3256.

### Water-Saving Devices

This fiscal year, HUD will be stressing energy conservation in its existing and new projects. In this regard, project owners and managers should also be trying to conserve water where possible.

The following is a round-up of the latest water-saving devices, their cost, and their expected savings:

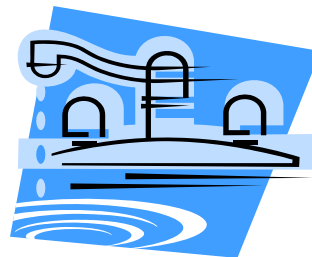


*\*Dual-Flush Toilet*– Uses .8 gallons for a liquid flush and 1.6 gallons for a solid flush. By, comparison, a low-flush toilet uses 1.6 gallons per flush and pre-1992 toilets use between 3.5-7 gallons. A household of four can save 11,000 gallons per year using a 1.6 gallon toilet vs. a 3.5 gallon toilet. The cost of a dual-flush model ranges between \$700-\$878.

*\*Pressure-Assisted Toilet*– Uses 1 gallon per flush. A family of four can save thousands of gallons per year. The cost is about \$425.

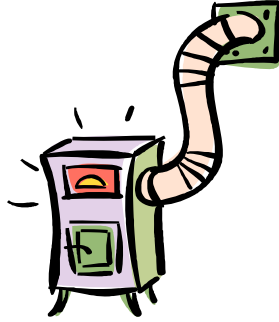
*\*Front-Loading Washer*– Uses tumbling action to clean clothes instead of immersing garments in water. This type of washer uses 14-25 gallons per load vs. 50 gallons per load for a top-loading washer. Manufacturers of front-loading washers claim a 68% savings and state that a family of four can save as much as 12,000 gallons per year. Because this type of washer uses less water it also uses less detergent. In addition, because they spin better, less energy is consumed drying clothes and there is less wear and tear on clothes. The cost of this type of washer range from \$650-\$1,299.

*\*Faucet Aerator*– Typical faucets emit up to 3 gallons per minute. Aerators restrict flow to as little as 1/2 gallon per minute. They work well on bathroom sinks but are impractical for tubs or kitchen sinks where a lot of water is needed. A typical family can save as much as 9,700 gallons per year. The cost is minimal at \$1.50 per device.



### Furnace Efficiency

If you will be replacing furnaces, keep in mind that whatever you choose should have a high annual fuel utilization rating (AFUE). The higher the AFUE, the more efficient the unit.



Federal Appliance Energy Standards of 1993 essentially require manufacturers to make units with an AFUE of at least 80%, and there are units that are up to 96% efficient.

Another energy saver is to use an electronically commuted, or ECM, blower motor. In a typical home, the annual cost to operate a standard furnace fan is \$250. However, an ECM would cost only \$50 per year.

### Dryers and Furnaces

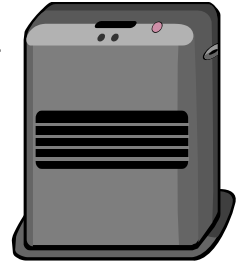
The American Gas Association (A.G.A.) has stated that gas dryers are a customer's best buy because of the energy value of natural gas and the latest high efficiency technology, such as pilotless ignition, automatic shut-offs, sensor controls, de-wrinkling cycles, and automatic cool-down cycles. In fact, it was reported that you can dry three loads of laundry for the money that it takes to dry one load in an electric dryer. Gas dryers also require little upkeep. The only things to keep in mind are to clean the lint screen regularly and to make sure that the exhaust is properly vented to the outside. Consumers should look for the Blue Star Design Certificate seal or another form certification from a nationally recognized testing agency.

Hearing systems should be serviced periodically by qualified contractors to insure that they operate in peak condition. Prior to the start of the heating system, a "check-up" should be performed. It should consist of the following steps:

- \*Inspection of the furnace vent system.
- \*Removal of any leaves, nests, or other obstructions from inside the chimney.
- \*Monthly replacement or cleaning of the air filter.
- \*Lubrication of the blower motor.
- \*Replacement of blower belts, if needed.
- \*Cleaning of pilots and burner chamber.
- \*Removal of dust and lint from furnace vents, registers, and baseboard heaters.
- \*Cleaning and adjusting of thermostats.

### Electric Motors and Speed Drives

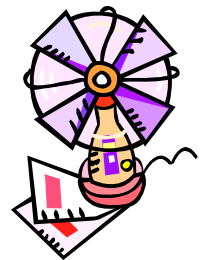
One way to reduce energy costs in high-rise buildings is to install high efficiency electric motors for chillers (e.g., an upgrade of an 800 ton chiller, from 0.7kW/ton to 0.5kW/ton will reduce demand by 160kW, a 27% savings), and fan and pump motors (e.g., replacement of smaller motors can improve efficiency up to 15%). A plan can be developed to replace old motors with high efficiency units on a set schedule, or when they break down or need repairs. The initial premium cost can be recovered in energy savings during the first year- a 100% return on your investment. The energy savings will continue, so that by the end of the 5th year, the total cost of the motor will be recovered- a return of more than 20% per year.



A second way to save on energy costs, is to use adjustable speed drivers (ASD) to allow HVAC motors of 100 hp or more, to reduce their speed (rpms) by 20%, when the system is at or below 70% capacity. This, typically, results in a 50% reduction of energy consumption.

### Energy Efficient Air Conditioners

Central and room air conditioners have become much more efficient in recent years. This translates into lower electricity costs during the summer months.



The current federal minimum SEER (Seasonal Energy Efficiency Ratio) for an air conditioner manufactured since 1992 is 10 SEER. This minimum is being increased to at least 12 SEER by the end of 2006.

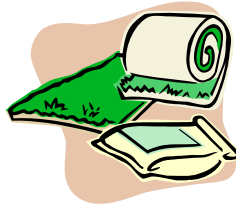
Studies have shown that in a typical detached single-family property, a savings of \$155/yr. in electricity costs could be realized by replacing a 10-year old central air conditioning system with a 14 SEER unit. In addition to the utility savings, a homeowner would qualify for a \$500 rebate from his utility company for the upgrade. Combined, this would be a savings of \$1,275 over the next five years. In addition, many manufacturers are also offering their own rebates on new models. This savings would be magnified if the unit that was being replaced had a SEER of only 6. In this case, the savings would be \$434/yr. In 5 years, the system would almost pay for itself with a total savings of \$2,670.

In comparing the energy efficiency of room air conditioners, look for the bright yellow Department of Energy

Guide and Energy Star labels. Each Energy Guide label gives you an estimated yearly operating cost of that unit at various utility rates and hours of use. Similarly, the ENERGY STAR™ symbol identifies products that save energy and money and protect the environment.

**Green Roofs**

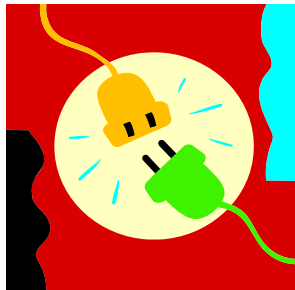
A new trend is starting in the United States- green roofs. Green roofs have been fairly common in Europe, especially Germany, for years. The idea is to cover roofs with 3-6" of soil and create a "meadow" of native plants and grasses. The soil and plants act like a sponge to absorb rainwater, create insulation, and protect the roof.



In urban Europe, where asphalt covers much of the land, green roofs help to reduce the amount of water runoff that enters storm drains and, eventually, rivers. Most green roofs in the U.S. are on newer commercial or public buildings. However, many older buildings, especially ones constructed with brick in the 1920s, can be retrofitted. The key is that the roof must be able to support 13 lbs. per sq. foot.

**Energy Usage**

Do you know how to accurately determine your project's energy usage? The National Apartment Association recommends that that you follow these simple 8 steps: 1. Obtain a printout of fuel usage (i.e., consumption-not bills); 2. Select approximately one year of usage; 3. Determine which fuel is the most expensive by BTU; 4. Separate heating from hot water consumption; 5. Calculate base energy usage (e.g., for oil and gas- June through September); 6. Break it down on a daily basis in order to help estimate how efficiently the buildings are heated, cooled, and make hot water; 7. Divide the consumption by the square footage of the building to determine BTUs/ Square Foot Per Year; and 8. Factor in Degree Days (available from newspapers).



Two free HUD publications that you may find particularly useful are: "Energy Conservation for Housing- A Workbook" (call 1-800-955-2232), and "HUD Multifamily Walk-through Energy Survey". This document can be obtained from the local HUD office.

**Fluorescent Bulbs**

Fluorescent bulbs have long been a popular choice among apartment managers as a way to save on electricity costs. They produce four times the lumens for an equivalent amount of watts. However, one of the disadvantages of fluorescent bulbs has always been the harsh light that they emit. Now, several manufacturers, such as Philips and GE, have come out with a new line of "soft-tone" bulbs. Although the bulbs eliminate the stark white light of standard fluorescent, they are much more expensive (e.g., instead of \$2 for a 48" fluorescent tube, prices range from \$4-\$25). Manufacturers state that although the new bulbs are more expensive than incandescent bulbs, they still have the energy savings of standard fluorescents (e.g., a 28 watt soft-white fluorescent can save \$100 in energy costs over its life (10,000 hours) compared to incandescent bulbs.



**High Efficiency Lighting**

Projects can save an additional 3-6% in energy costs using high efficiency electronic ballasts. When they are used with newer T8 lamps, you could save up to 11%. In order to achieve this savings, you should install ballasts with light output factors of .78 (for converting a 34 watt T12 lamp to a T8), and .88 (for new construction). You can save even more by using occupancy sensors to reduce or turn off the lights when rooms are not in use.

**Energy Codes**

The Energy Desk Book for HUD Programs contains a section on HUD's energy codes requirements. Among other things, the Desk Book contains the DOE Building Codes Assistance Project (BCAP) summary of the status of state adoption of energy codes. It is updated a few times a year. Below is the URL to the Winter 2002 version:



[www.huduser.org/Publications/PDF/energybook.pdf](http://www.huduser.org/Publications/PDF/energybook.pdf).

## Water Conservation

Water rates have risen dramatically over the past several years to over \$500 per year for the average American home and are expected to double in the next two years. This large increase is due primarily to improvement of water treatment facilities, the lack of federal subsidies for infrastructure work, and the need for improved capacity and safer drinking water. In addition, in recent years, many communities imposed water use restrictions because of summer drought conditions.



In response, many apartment owners implemented water conservation measures themselves, or through performance contractors whose fees were paid from the savings on utility expenses. Some of the measures that can be taken are as follows:

- \*Reduced flow showerheads.
- \*Reduced flow aerators (1.5 gpm).
- \*Removal of sediment from system.
- \*Repair of all interior and underground leaks.
- \*Anti-scald valves.
- \*Leak prevention siphons on toilets.
- \*New toilet flappers every 5 years.
- \*Computerized hot water loop controls.
- \*Landscape irrigation controls.
- \*Leak-proof faucets (with ceramic valves).
- \*New pool filter media (minimize back-flushing).
- \*Use of electroplating and filtering minerals to lower water chemical consumption in cooling towers.
- \*Sub-metering.

Your water consumption goal should be 50 gallons per person per day. If you successfully implement the above conservation measures, you will be pleasantly surprised at the savings that will be generated.

HUD and the Partnership for Advancing Technology in Housing (PATH) have published a guide, Overview of Retrofit Strategies: A Guide for Apartment Owners and Managers to help owners and managers of multi-family properties address these challenges through water conservation. This publication describes techniques property managers may use to conserve water, with approaches requiring modest investment and minimal construction. By describing options in a non-technical manner, owners and managers will be able to select the most appropriate conservation measures for their particular situation. Although the primary benefit of conserving water will be a reduction in the costs of

operating the building, secondary benefits may include higher property values, some energy savings, and improved relations with residents.

Both this guide, and a companion guidebook, Retrofitting Apartment Buildings To Conserve Water: A Guide for Managers, Engineers, and Contractors, are available free from HUD USER. To download a copy, visit the following website: [www.huduser.org/publications/destech/retrofitting.html](http://www.huduser.org/publications/destech/retrofitting.html).

## Laundry Equipment

For maximum efficiency and cost savings laundries should be equipped with Energy Star-qualified washers and dryers.



In addition, you should look at the water extraction (i.e., drying) speed of washing machines. Top loading models should operate at 710 rpm and front-loaders at 1,000 rpm. (See the October 2004 issue of Philadelphia Multifamily Hub News). Also, to maintain a consistent water temperature the washer should be preset to the permanent-press/warm setting.

Gas dryers are preferable to electric models because they cost 1/3 less to operate. Gas heat also will dry clothes faster. Make sure, however, that there is enough "make-up air"- the air that the gas burners require to burn efficiently.

If you have to use electric dryers, make sure that they are using the correct electrical service. If they are not sized properly (i.e., matched with the correct voltage) the dryers will take longer to dry clothes and will cost more to operate.

Other tips to consider are: use metal vents to avoid lint blockages; make sure that lint traps are emptied after each wash-load; and encourage the use of washers and dryers during off-peak times.

Note: The Multi-Housing Laundry Association has asked the EPA to consider a water-efficient product-labeling program similar to Energy Star, the government program that identifies energy-efficient products. It is believed that such labels will help encourage apartments to purchase water-efficient appliances and adopt common laundry facilities to conserve water.

### Combined Heat & Power Guides

HUD's Energy website now contains two new guides concerning co-generation- combined heat and power (CHP) in multifamily housing.

The guides were produced as part of the implementation by HUD and DOE of the HUD Energy Action Plan. Initiative Number 20 in that Plan commits HUD to promote the use of combined heat and power in housing and community development.



CHP can significantly reduce a building's annual energy costs. Instead of buying all of the building's electricity from a utility and separately purchasing fuel for its heating (mechanical) equipment, most- or even all- of the electricity and heat can be produced for less money by a small on-site power plant operating at a higher combined efficiency.

The type of CHP system commonly applied to multifamily housing uses a device that contains an engine, similar to that found in a car, or a micro-turbine, that drives a generator to produce electricity. The heat (thermal energy) produced by this process is recovered and used to produce hot water or steam, operate a chiller, or serve as a desiccant instead of being exhausted from the engine and transferred through the engine radiator (as in a car).

Guide #1: "Q&A on Combined Heat and Power," addresses the questions typically asked by those exposed to CHP for the first time.

Guide #2: "Feasibility Screening for combined Heat and Power," explains use of the computer software developed by the Oak Ridge National Laboratory. If you insert utility cost and rate information for the past twelve months, the Guide will roughly calculate the return on investment from installing combined heat and power. That computer software will soon be put up on the Oak Ridge National Laboratory web site and linked to HUD public and assisted housing, FHA multifamily mortgage insurance and CPD web sites.

The guides can be downloaded at: [www.hud.gov/offices/cpd/energyenviron/energy/index.cfm](http://www.hud.gov/offices/cpd/energyenviron/energy/index.cfm) under "What's New."

### Dual-Flush Toilets

An economical way to save on water bills is to install dual-flush toilets. These toilets, which have been in use in Europe, Australia, and Japan for at least 30 years, offer 0.8 gallon and 1.6 gallon flushing options.

Their design is better than most of the 1.6 gallon, one-flush toilets that have generated so many complaints over the years. They are also reasonably priced, with most models costing less than \$300 each.



### New Lighting Cuts Expenses



The lighting industry has created brighter, cheaper compact florescent lamps, or CFLs, that help reduce high energy costs.

CFL usage has increased from 2.3% of the bulb market in 1999 to 5.6% in 2006. This increase is attributable to two factors- the high cost of electricity (lighting accounts for 20% of a home's electricity costs) and the lower cost of the CFL bulbs that have decreased from, \$10-\$15 to \$5 (note the cost per bulb is actually cheaper if purchased in bulk quantities).

### Insulation Paint

The insulation factor of dwellings can be enhanced by the application of exterior insulation paint or insulating paint additives. These products use a blend of insulating ceramic microspheres or "vacuum beads", that are designed specifically for mixing into paints, coatings and composites to form a tight interlocking matrix which reduces conductive heat through the painted surface. The ceramic barrier reflects up to 90% of the heat back to the source. They are designed to keep heat out in summer and reflect the heat back in during the winter drastically reducing the costs required for heating or cooling.



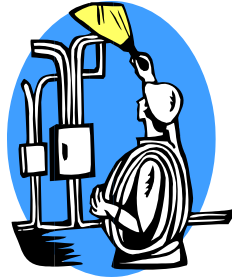
For more information, see the websites of the following manufacturers: Chem-Rex ([www.chemrex.com](http://www.chemrex.com)), Insuladd ([www.insuladd.com](http://www.insuladd.com)), and Hy-Tech Insulating Paint, ([www.hytechsales.com](http://www.hytechsales.com)).

**Tip for Efficient Laundries**

To save on energy costs for central laundries, you should consider installing card-operated appliances so that your operator can set a higher vender price for hot-water washes and a lower price for cold-water washes.

**Forensic Engineering**

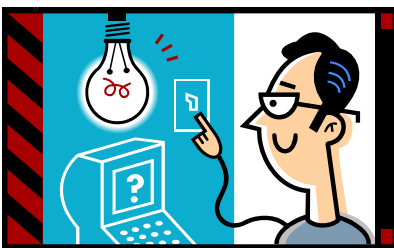
A new and “high-tech” way to diagnose and prevent problems, or analyze system performance in high-rise buildings, is to employ the techniques of forensic engineering.



Forensic engineers, when possible, use non-invasive devices such as electromagnetic detection equipment, infrared imaging, ground-penetrating radar, and X-ray imaging to analyze complex structural or system problems. When necessary, they also utilize bore-scopes, fluorescopes, and videoscopes to minimize the amount of material that must be removed for the inspection.

Forensic engineering can be used to detect construction deficiencies (e.g., improper exterior wall flashing), maintenance deficiencies (e.g., roof penetrations), design flaws (mold due to improper mechanical ventilation system), causes of pipe corrosion, etc. It can also be used to recommend elements to incorporate into the

**New Lighting Technology**



There is a new lighting product on the market that provides the same amount of light as standard incandescent bulbs but provides substantial utility savings to the user.

The new product is a spiral-shaped bulb that uses phosphors in argon-filled tubes. A unique feature of these bulbs is the phosphors- powdery elements that glow within their argon-filled bulbs to create warmer hues similar to incandescent bulbs. These bulbs are Energy Star-qualified and use lower wattage than conventional bulbs while providing the same brightness (e.g., 800 lumens for an equivalent 60-watt incandescent bulb). It is estimated that by replacing five lights with this product, a savings of \$60 per year could be achieved.

**PHFA’s “Green” Building**

Last year, the Pennsylvania Housing Finance Agency (PHFA) moved into its new headquarters’ building in downtown Harrisburg, PA.



In designing its new building, PHFA incorporated some of the historic characteristics of the surrounding properties and the latest technologies for energy conservation and environmental sensitivity. Another goal was to design working conditions that enhance and encourage productivity.

For starters, the office building was designed with a light beige color with a white roof to reduce the “heat island effect” that is common to dense urban areas. Because the building reflects heat, it has a reduced air-conditioning load and energy consumption. The building also features an abundance of glass and windows reducing the need for artificial light.

Integrated systems are centrally managed and monitored to work together. For example, the lights are controlled by photocells that adjust overhead lighting as needed. Rooms have motion sensors to turn lights off and on when someone enters a room. Interior paints were also selected for their reflectivity.

Other unique features of the building are: a 10,000 gallon rainwater storage tank for toilet flushing, low-volume plumbing fixtures, high level of roof and wall insulation, steam heat from Harrisburg’s municipal incinerator, a fresh air intake system using carbon monoxide sensors, compartmentalized ventilation, 25% recycled materials (carpets, wall fabrics, steel, and concrete), use of renewable resources (e.g., bamboo floors), and modular workstations with ergonomic chairs.

Lastly, 80% of the waste generated during construction was recycled.

The building is an excellent example of an efficient, environmentally sensitive 21st century building. After the mandatory operating cycles and testing periods required for accreditation, it is expected to earn a “Silver Certification” from the U.S. Green Building Council- the second highest level in the LEED (Leadership in Energy and Environmental Design) rating system.



**Saving Money on Utilities**

K & M Management of Dallas, TX has implemented a novel idea to save on its projects' sewer bills. It has convinced all of the towns in which it manages properties to deduct the volume of water used for landscaping from its sewer bills. It accomplished this by sub-metering its buildings to measure how much water is used to irrigate its lawn areas. Although the meters and the sprinkler piping can cost between \$3,000-\$30,000, the system can quickly pay for itself. (Reference: June 2005 issue of Apartment Finance).

**Motor System Efficiency**



The U.S. Dept. of Energy has created a free software tool, called MotorMaster+, to help owners to manage existing motor systems and select energy efficient replacements. The tool handles everything from calculating payback on a single motor

purchase to comprehensive, integrated motor system management. The website is as follows: [www.oit.doe.gov/bestpractices/software\\_tools.shtml](http://www.oit.doe.gov/bestpractices/software_tools.shtml).

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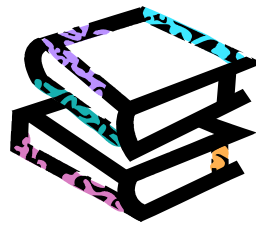
**Energy Star Appliances**



The payback time for purchasing Energy Star appliances is surprisingly quick.

You can recoup the expense of a washer in 4 years; a dryer in 3 years, and a dishwasher in only 1 1/2 years!

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HUD's Energy website now contains two new guides concerning cogeneration- combined heat and power (CHP) in multifamily housing.

The guides were produced as part of the implementation by HUD and DOE of the HUD Energy Action Plan. Initiative Number 20 in that Plan commits HUD to promote the use of combined heat and power in housing and community development.

CHP can significantly reduce a building's annual energy costs. Instead of buying all of the building's electricity from a utility and separately purchasing fuel for its heating (mechanical) equipment, most- or even all- of the electricity and heat can be produced for less money by a small on-site power plant operating at a higher combined efficiency.

The type of CHP system commonly applied to multifamily housing uses a device that contains an engine, similar to that found in a car, or a micro-turbine, that drives a generator to produce electricity. The heat (thermal energy) produced by this process is recovered and used to produce hot water or steam, operate a chiller, or serve as a dessicant instead of being exhausted from the engine and transferred through the engine radiator (as in a car).

Guide #1: "Q&A on Combined Heat and Power," addresses the questions typically asked by those exposed to CHP for the first time.

Guide #2: "Feasibility Screening for Combined Heat and Power," explains use of the computer software developed by the Oak Ridge National Laboratory. If you insert utility cost and rate information for the past twelve months, the Guide will roughly calculate the return on investment from installing combined heat and power. That computer software will soon be put up on the Oak Ridge National Laboratory web site and linked to HUD public and assisted housing, FHA multifamily mortgage insurance and CPD web sites.

The guides can be downloaded at: [www.hud.gov/offices/cpd/energyenviron/energy/index.cfm](http://www.hud.gov/offices/cpd/energyenviron/energy/index.cfm) under "What's New."

## Energy Conservation

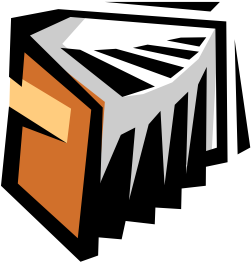


Public Housing utility costs total around \$1.3 billion per year. To cut this cost, HUD promotes energy and water conservation through the Public Housing Energy Conservation Clearinghouse (PHECC). The PHECC website includes information on Energy Performance Contracting, education materials for residents, funding

incentives, maintenance strategies, a training calendar, and more.

PHECC also distributes a monthly newsletter. It features up-to-date energy news and resources to help public housing authorities efficiently manage energy and water costs. To see past issues of this e-newsletter, and to access more information and tools for public housing authorities, visit the Public Housing Energy Conservation Clearinghouse Website at: [www.hud.gov/offices/pih/programs/ph/phecc/index.cfm](http://www.hud.gov/offices/pih/programs/ph/phecc/index.cfm).

## Energy Desk Book



Energy efficiency is essential to help the Department achieve its goals, including expanding affordable housing, increasing homeownership, and creating jobs and economic opportunity. In 2000, HUD published an Energy Desk Book which spotlighted the heavy burden utility costs can place on

affordable housing and economic development. The book remains relevant today as it reviews the important energy mandates for HUD programs and discusses the resources available to reduce these costs for American families and communities. By improving energy efficiency, HUD can help families save money they otherwise would need to spend on energy- freeing up precious dollars for food, shelter, and other necessities. Lower utility costs also can help communities by helping business and industry and contributing to economic growth.

The Energy Desk Book is a tool that you may find useful to identify opportunities to incorporate energy conservation measures into your buildings. The book can be downloaded at:

[www.huduser.org/publications/destech/destech3.html](http://www.huduser.org/publications/destech/destech3.html).

## Utility Expenses



Utility expenses this winter have increased dramatically. To help mitigate the impact on your property, you should take the following actions:

1. *Energy Plan.* Conduct an energy conservation plan for your property. Make sure that your property is weather insulated to avoid “energy loss.”
2. *Educate Tenants to Conserve.* Circulate flyers reminding tenants/residents to conserve energy.
3. *Utility Allowance.* Make sure that the amount of allowance is still accurate. Determine if an increase in the dollar amount is necessary. Please refer to Chapter 7 of HUD Handbook 4350.01 Rev-1 for information regarding utility allowance increases.
4. *Utility Company Coordination.* You may contact your utility company for programs relating to energy conservation, payment plans and/or grants. If possible, make larger monthly (higher amount than your regular bill) payments to cover anticipated higher bills for winter months.
5. *Budget Review.* Identify the source of money in your budget that you can use to cover the anticipated higher energy bill.
6. *Budget Rent Increase/Reserve & Residual Accounts.* For properties that may require special budget increases or disbursement of funds from the Reserve or Surplus Accounts, please contact your assigned HUD Project Manager to discuss these options.

## Pilot Energy Program

Public Service Electric and Gas has expanded a pilot program to give consumers greater control over their energy use. The “myPower” pilot program has been offered to 800 residents in Cherry Hill and Franklin Township, NJ. Business and home customers will have special thermostats installed that will allow them to receive information about changing energy prices. The customers will then have the option of moving their energy usage to times when prices are lower, such as evenings and weekends.



**Thrifty Appliances**



With rising utility bills, it is becoming vital that project owners and managers replace inefficient appliances with Energy-Star label units.

*Refrigerators-* A kitchen's biggest energy drain is its refrigerator. Energy-Star models use 40% less energy than conventional machines sold as recently

as 2001. Look for ones with compressors that run at more than one speed so they do not use high energy levels unless necessary.

*Washers-* Energy-Star front and top-loading washers use 50% less energy than standard models, saving up to \$110 per year. [Review the Modified Energy Factor (MEF) at [www.energystar.gov](http://www.energystar.gov)]. The higher the number, the less energy per load. New top-performing "duet" washers save energy and water (more than 12,000 gallons a year).

*Dishwashers-* Energy-Star models use 25% less energy than standard machines. By replacing a pre-1994 model, you can save more than \$25 a year. New two-compartment units save even more because you can run small loads in one compartment instead of running the whole machine.

**Energy Policy Act of 2005**

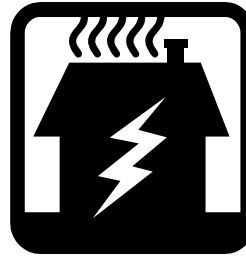
The Energy Policy Act of 2005 provides new tax incentives to rental housing of four stories or more or systems put into place during 2006-2007.



Specifically, the provisions under this 1,724-page law, offer business taxpayers a deduction of \$1.80 per square foot for commercial buildings that achieve a 50% reduction in annual energy costs to the user, compared to a base building defined by ASHRAE/IESNA 90.1-2001 Energy Standard for Buildings Except Low-Rise Residential Buildings. Energy costs refer to heating, cooling, lighting, and water heating.

Compliance is determined by third-party inspectors who review the plans and the actual in-place construction. Energy savings are determined by software that must be certified by the Dept. of Energy.

**Radiant Flooring**



Nursing homes and assisted living units are beginning to incorporate radiant floor heating into their buildings where elderly tenants are particularly prone to cold temperatures.

Radiant floor heating warms a space from the ground up. Besides making living areas more comfortable for the elderly, it also saves energy.

There are two types of radiant heat methods. One option pumps water heated by natural gas through a matrix of pipes. A drawback of this method, however, is the installation expense. The second is a network of low voltage electric wires laid beneath tile or laminate surfaces and encased in insulative mats fitted to the configuration of the floor. (Note: It cannot be installed under carpets or wood floors). The mat is rolled out and held in place by adhesive. Flooring is then on top of the mats.

This system uses "zoned" wiring in areas frequently used such as bathrooms, kitchens, and family rooms. Twelve watts per square foot generates floor temperatures from 82° to 90°. Since objects that come into contact with the floor are heated, the occupants feel warm even though the air temperature inside the is cooler.

The advantages of radiant floor heating are: lower operating costs, higher reliability (no moving parts), no cooling air drafts. Energy savings can also be enhanced by using programmable thermostats that allow occupants to turn off the system at night or when away from their units. The system can be set to turn on shortly before occupants arise in the morning or return to their units.

The best time to install these systems is during new construction or amid renovations when the existing floor is removed.

**Energy Facts**

- The average American family will spend more than \$2,000 on home utility bills this year (American Council for an Energy-Efficient Economy).
- As much as 45% of home energy usage is dedicated to heating and cooling (Dept. of Energy).
- Turning back a thermostat 10-15% for 8 hours per day can cut annual heating bills by 10% (American Gas Association).

**Cogeneration in New Jersey**



In the December 2005 issue of Philadelphia Multi-family Hub News, we discussed the availability of two new energy guides on cogeneration that are available from HUD's energy website at: [www.hud.gov/offices/cpd/energyenviron/energy/index.cfm](http://www.hud.gov/offices/cpd/energyenviron/energy/index.cfm).

Rowan University, in Glassboro, NJ, a previous recipient of a \$153,364 HUD college housing grant, has become a model for this concept and is helping the state meet a major challenge—the coexistence of economic development and environmental protection. Overall, it has invested about \$26.5 million to upgrade its power plant. By September 2006, it will be producing 1.5 megawatts of power. This will generate close to 80% of its electricity needs and will provide air conditioning to some of its buildings. Cogeneration which involves taking heat energy- a byproduct of electricity production- will use it to heat and cool campus buildings rather than expelling it into the atmosphere and contributing to air pollution.

Here's how Rowan's cogeneration units work:

- \*Natural gas or fuel oil mixes with air in a combustion turbine to create energy.
- \*The energy is used to move the blades of a generator, which produces electricity for campus use.
- \*At the same time, the heat from the combustion process is used to heat water, which produces steam.
- \*The steam moves through underground lines to campus buildings, where it is used for heating and hot water.
- \*The steam can also proceed to a water chiller, where it is used to power machinery that cools water for air conditioning.

Projections show that Rowan will save around \$1.2 million a year. This is attractive because the school spent \$7.3 million on electricity, natural gas and fuel oil between July 2004 and June 2005 (reference January 9, 2006 Courier-Post).

Because of the project's high energy efficiency, the school will receive \$1 million rebate from the NJ Board of Public Utilities' Clean Energy Program and about \$600,000 in rebates for other energy initiatives around the campus.

**New Air Conditioning Standards**



New air conditioning standards went into effect January 2006 for newly manufactured central air conditioning systems to increase energy efficiency in residences.

The new SEER standard is now 13. This high efficiency standard will greatly reduce energy costs and will save the nation \$1 billion over the next 25 years.

For more information go to: [www.eere.energy.gov/buildings/appliance\\_standards/residential/central\\_ac\\_hp.html](http://www.eere.energy.gov/buildings/appliance_standards/residential/central_ac_hp.html).

**Practical Conservation Tips**



The following practical energy conservation tips have been suggested by PGW (Philadelphia Gas Works):

1. Insulate, especially under the roof. Caulk and weather-strip doors and windows.
2. Install storm windows. Use drapes and blinds to re-duce loss of heat through glass.
3. Keep furnace filters clean and your heater operating efficiently.
4. Install a programmable thermostat. It can save as much as 33% on energy bills and can usually pay for itself within a year. (Prices start at about \$30).
5. Set your programmable thermostat to 68° or lower during active hours. Lower the temperature at night and when everyone is away.
6. Use kitchen and bath ventilating fans sparingly in cold weather. In just one hour, these fans can blow away a house-full of warm air.
7. Make sure doors fit snugly and are weather-stripped. Repair any cracked glass or loose putty. Fix leaky faucets.
8. Insulate your gas water heater, drain sediment from the bottom of the tank, and set the temperature to 120°.
9. Replace aging appliances with new high-efficiency equipment, if possible. A 93%-efficient furnace saves an average of \$135 per year in fuel costs, compared to a conventional 78%-efficient model.
10. Reverse the blade rotation on ceiling fans to draw warm air down to living spaces. This can cut heating bills by as much as 10% a season.

### **Energy-Efficient Roofs**

The level of insulation applied and a roof's surface reflectivity, greatly impacts heat loss or gain.

According to Energy Star®, roof products that reflect the sun's ultraviolet rays can decrease the amount of air-conditioning needed in buildings and peak cooling demand by 15%. Short term solutions can be paints and coatings that turn dark roofs white to long-term waterproofing solutions such as highly reflective white or light-colored single-ply vinyl membranes and green" (planted) roofs.

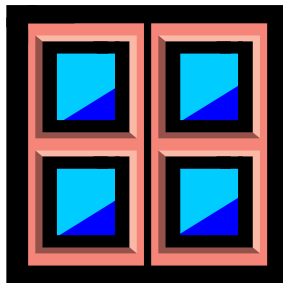


A good resource to compare roof systems is the Cool Roof Rating Council at: [www.coolroofs.org](http://www.coolroofs.org).

### **Window Films**

Window films are designed to stop between 30-83% of the solar energy that strikes the window.

Although they are energy neutral in the winter, they save energy in the summer by reducing air-conditioning loads.



Some types of window film are: Low E– Microscopically thin, virtually invisible metal or metallic oxide layers deposited on the glass in a window or skylight that reduce heat transfer between the layers of glass; and Low Solar Heat Gain Low-E Coatings– Allow visible daylight in and reflect the harmful ultraviolet and infrared rays out. Because these coatings have low emissivity, they provide an added layer of insulation as well.

### **Pilot Energy Program**

Public Service Electric and Gas has expanded a pilot program to give consumers greater control over their energy use. The "myPower" pilot program has been offered to 800 residents in Cherry Hill and Franklin Township, NJ. Business and home customers will have special thermostats installed that will allow them to receive information about changing energy prices. The customers will then have the option of moving their energy usage to times when prices are lower, such as evenings and weekends.

### **Energy Tax Deduction**

The Internal Revenue Service has Notice 2006-52, Deduction for Energy-Efficient Commercial Buildings. This tax incentive was included in the Energy Policy Act of 2005.

The new law provides for a tax deduction of up to \$1.80 per square foot for energy-efficient upgrades that achieve a 50% reduction in annual energy and power costs to the user compared to a base building defined by the ASHRAE/IESNA 90.1-2001 standard. Energy costs refer only to heating, cooling, lighting and water heating. A deduction of up to \$.60 per square foot will be available for upgrades to each of the three energy-using systems of a building– lighting systems; heating, cooling, ventilation and water heating systems; and the building envelope (adding up to the full \$1.80 per square foot that is available for new construction if qualifying retrofits are made to each of the three systems).

A qualifying building can be any type of commercial building that falls under the scope of the ASHRAE 90.1 standard, including multifamily properties of four or more stories.

In order to obtain the tax deduction, the building owner must obtain a certification from a "qualified individual" that the property satisfies the energy-efficiency requirements of statute 179D(c) and (d). The notice also provides a public list of software programs that must be used in calculating the energy and power consumption. The list will eventually be posted on the following Dept. of Energy website:

[www.eere.energy.gov/buildings/info/tax\\_credit\\_2006.html](http://www.eere.energy.gov/buildings/info/tax_credit_2006.html).

Energy-efficient properties must be put into place between January 1, 2006 and December 31, 2007 to qualify for the deduction.

A copy of Notice 2006-52, can be obtained from the following IRS website:

[www.irs.gov/irb/2006-26\\_IRB/ar11.html](http://www.irs.gov/irb/2006-26_IRB/ar11.html).

### **Energy Star Products**

A listing of Energy Star qualified products (i.e., products that use less energy, save money and help protect the environment), can be found at: [http://www.energystar.gov/index.cfm?fuseaction=find\\_a\\_product](http://www.energystar.gov/index.cfm?fuseaction=find_a_product).



**Solid State Lighting Systems**

The most common source of lighting is the old-fashioned incandescent vacuum bulb. It is one of the world's worst energy-wasters. Only 5% of its energy it consumes is turned into light. The rest is wasted as heat. A florescent lamp is more efficient, but it still puts out only 25% of its energy as light.

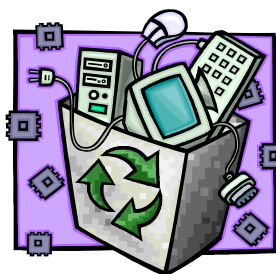


With the aid of academic and private industry researchers, the Department of Energy is seeking to replace these wasteful bulbs, in the future, with solid-state lighting devices that attain 50% efficiency.

Solid-state lighting systems consist of light-emitting diodes (LEDs) and are currently used in such things as digital clocks, car taillights, traffic signals and stage lights. LED devices are made of semi-conductors- the silicon crystals used in computer chips. They produce little heat, use no hazardous materials and can last for years.

By 2025, the Energy Department claims that solid-state technology could cut in half the electricity Americans use for lighting, significantly reducing energy demand and environmental pollution. It could save an astounding \$30 billion a year in electricity bills!

**Lamp Recycling**



The Environmental Protection Agency (EPA) promotes the safe recycling and disposal of certain used lamps, especially florescent and high intensity discharge (HID) lamps. The EPA believes that this waste can be managed under its universal waste program (i.e., Resource Conservation and Recovery Act) and does not have to be treated as hazardous waste.

This approach results in better control of hazardous emissions while streamlining many regulatory requirements for industry. It also encourages the manufacture of low-mercury lamps and makes the requirements for handling and disposal of these materials consistent with many state programs.

The National Electrical Manufacturers Association (NEMA) sponsors a website that provides a wealth of

information on this subject such as: the benefits of recycling, the 2004 recycling rate, state recycling regulations, state contacts, lamp recyclers, an EPA Fact Sheet, and a link to the July 6, 1999 Federal Register dealing with hazardous waste lamps.

The website address is as follows:

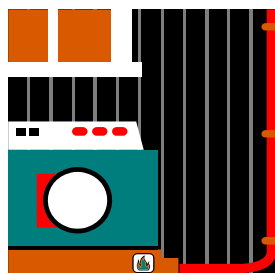
[www.lamprecycle.org](http://www.lamprecycle.org).

**Energy Star Computers**

Energy Star computers use 70% less energy than standard computers. To save even more money, purchase laptops instead of desktop models when you are upgrading your equipment- they use almost 90% less energy.



**HVAC Systems**

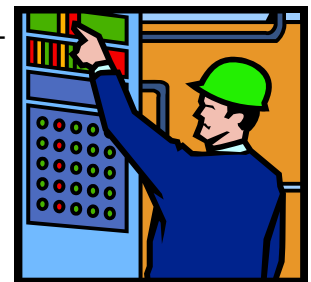


When heating, ventilation and air conditioning (HVAC) systems need replacement, building owners should invest in ones that have high Energy Star SEER (Seasonal Energy Efficiency Rating) ratings. HVAC systems are responsible for 30-50% of a building's energy use. Today's HVAC technology can considerably reduce emissions and costs.

**New Lighting Cuts Expenses**

The lighting industry has created brighter, cheaper compact florescent lamps, or CFLs, that help reduce high energy costs.

CFL usage has increased from 2.3% of the bulb market in 1999 to 5.6% in 2006. This increase is attributable to two factors- the high cost of electricity (lighting accounts for 20% of a home's electricity costs) and the lower cost of the CFL bulbs that have decreased from, \$10-\$15 to \$5 (note the cost per bulb is actually cheaper if purchased in bulk quantities).



**Energy Newsletters**

The Public Housing Energy Conservation Clearinghouse publishes a monthly newsletter covering energy conservation. While there are many interesting topics covered in this newsletter, you should pay particular attention to information provided in the May issue entitled, "State Incentives Database Now Includes Energy Efficiency."



As you know, HUD's goal is to assure that all owners and developers utilize the most energy-efficient means to build and to rehabilitate properties. The database provides additional tools to meet this goal.

The website address is as follows: [www.hud.gov/offices/pih/programs/ph/phecc/](http://www.hud.gov/offices/pih/programs/ph/phecc/).

**Energy-Efficient Roofs**

The level of insulation applied and a roof's surface reflectivity, greatly impacts heat loss or gain.



According to Energy Star®, roof products that reflect the sun's ultraviolet rays can decrease the amount of air-conditioning needed in buildings and peak cooling demand by 15%. Short term solutions can be paints and coatings that turn dark roofs white to long-term waterproofing solutions such as highly reflective white or light-colored single-ply vinyl membranes and green" (planted) roofs.

White PVC Single-Ply roofs, know as "cool roofing," can generate tremendous energy savings for a building. These savings can make a big difference in the cost of a 20-year roof.

In the July 2006 issue of Buildings, a White PVC Single-Ply 50,000 sq. ft. roof was judged to be \$104,750 cheaper than a Combined Black EPDM and asphalt built-up system (BUR) over its 20-year life, despite being slightly more expensive to install. This primarily due to \$84,000 in energy savings. Other savings are as follows: \$12,500 tear-off/disposal cost, \$3,500

maintenance and \$7,750 repairs.

A good resource to compare roof systems is the Cool Roof Rating Council at: [www.coolroofs.org](http://www.coolroofs.org).

**Centralized Laundries**

In an effort to cut energy costs, some apartment owners have chosen to place all of their project's washers and dryers in a centralized laundry room instead of multiple buildings.



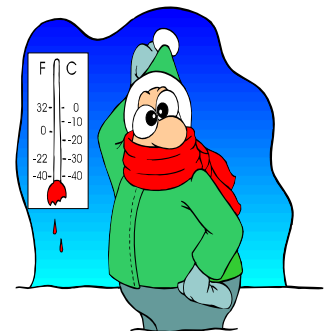
According to the Multihousing Laundry Association, centralized laundries can save up to 300% in energy costs compared to individual hook-ups. In addition, they can save at least 50% in development costs. Because all of the plumbing and drains are in one room, a significant energy savings can be realized since all of the heating generated is in one place as opposed to 10 individual rooms, for example. Centralized laundries also encourage tenants to do full loads, rather than partial loads in their own units.

Another feature is the use of "smart cards" which are purchased by tenants at a card-servicing center (usually in a safe, high-traffic area). These cards eliminate the need for cash when using washers and dryers which makes it safer for tenants. Approximately 20% of all centralized laundries are now making use of smart cards.

**New Air Conditioning Standards**

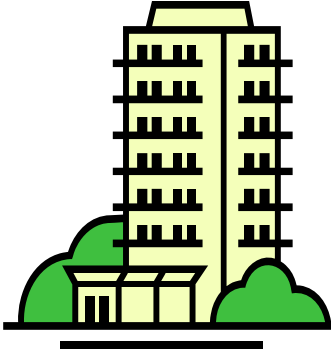
New air conditioning standards went into effect January 2006 for newly manufactured central air conditioning systems to increase energy efficiency in residences.

The new SEER standard is now 13. This high efficiency standard will greatly reduce energy costs and will save the nation \$1 billion over the next 25 years.



For more information go to: [www.eere.energy.gov/buildings/appliance\\_standards/residential/central\\_ac\\_hp.html](http://www.eere.energy.gov/buildings/appliance_standards/residential/central_ac_hp.html).

## LEED® Buildings



Buildings that emphasize water and energy efficiency, indoor air quality and reusable materials, among other criteria are eligible to receive Leadership in Energy and Environmental Design (LEED) awards.

Pennsylvania is one of the strongest states in the country in this effort. Leading this effort in PA is the City of Pittsburgh. Also, in Philadelphia, 12 buildings have received certification.

The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System was created by the U.S. Green Building Council (USGBC) to establish a "common standard of measurement" for "green" buildings. LEED® attempts to define a term that is often considered indefinable- sustainability.

LEED® certification is based on a point system. The amount of points achieved will determine which level of LEED® certification the project is awarded. There are 69 possible points and four certification levels:

Basic LEED® Certification requires 26 to 32 points;  
LEED® Certified Silver Level requires 33 to 38 points;  
LEED® Certified Gold Level requires 39 to 51 points;  
and LEED® Certified Platinum Level requires 52 to 69 points.

USGBC organizes the available points for LEED® certification into five broad categories. Below is a list of the categories and examples of required and possible points for each of the categories. USGBC also provides an optional sixth category for innovation and design process.

- **Sustainable Sites** (14 possible points total): Erosion and Sedimentation Control (required point); Site Selection (1 point); Urban Redevelopment (1 point); etc.
- **Water Efficiency** (5 possible points total): Water Efficient Landscaping, Reduce by 50% (1 point); Innovative Wastewater Technologies (1 point); Water Use Reduction, 20% Reduction (1 point); etc.

- **Energy and Atmosphere** (17 possible points total): Fundamental Building Systems Commissioning (required point); Minimum Energy Performance (required point); CFC Reduction in HVAC&R Equipment (required point); Renewable Energy, 20% (1 point); etc.
- **Materials and Resources** (13 possible points total): Storage and Collection of Recyclables (required point); Building Reuse, Maintain 75% of Existing Shell (1 point); Construction Waste Management, Divert 50% (1 point); etc.
- **Indoor Environmental Quality** (15 possible points total): Minimum IAQ Performance (required point); Environmental Tobacco Smoke (ETS) Control (required point); Ventilation Effectiveness (1 point); Low-Emitting Materials, Adhesives & Sealants (1 point); etc.
- **Innovation and Design Process** (5 possible points total): Innovations in Design, Provide Specifics (1 to 4 points) and LEED® Accredited Professional (1 point).

Detailed information on the various points and categories in LEED® for New Construction and Major Renovations (Version 2.1) is available on the USGBC website at: [www.usgbc.org/Docs/LEEDdocs/LEED\\_RS\\_v2-1.pdf](http://www.usgbc.org/Docs/LEEDdocs/LEED_RS_v2-1.pdf).

LEED® was first piloted in 1999. Today LEED® buildings represent a conservative estimate of 4 percent of the new construction market. However, because the rate of new buildings seeking certification increases rapidly, these figures will soon be out-of-date.

Seven agencies, making up much of the federal government, already are requiring the use of LEED® for new projects: General Services Administration, Army, Navy, Air Force, Environmental Protection Agency, National Aeronautics and Space Administration, and the National Park Service. As an example, Liberty Property Trust's new building in the former Philadelphia Naval Yard has been described as the most environmentally sound "green" high-rise in PA. In recognition of this, it has received a platinum rating under the USGBC's rankings. In addition to these federal agencies, several state and local governments are requiring the use of LEED® on all new public building projects.

Developers wishing to become LEED-certified and to qualify for numerous state and federal incentives should contact their state environmental protection agency.



**Energy Policy Act of 2005**

The Energy Policy Act of 2005 provides new tax incentives to rental housing of four stories or more or systems put into place during 2006-2007.



Specifically, the provisions under this 1,724-page law, offer business taxpayers a deduction of \$1.80 per square foot for commercial buildings that achieve a 50% reduction in annual energy costs to the user, compared to a base building defined by ASHRAE/IESNA 90.1-2001 Energy Standard for Buildings Except Low-Rise Residential Buildings. Energy costs refer to heating, cooling, lighting and water heating.

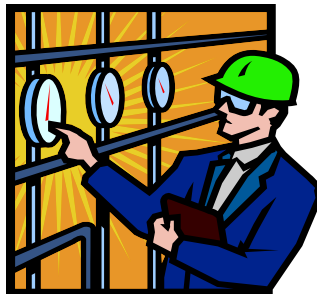
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Compliance is determined by third-party inspectors who review the plans and the actual in-place construction. Energy savings are determined by software that must be certified by the Dept. of Energy.

**Air Conditioner Maintenance**

Unnecessarily high electricity bills and potentially costly air conditioner repairs can be minimized by the proper care of cooling equipment. Cooling systems must operate at peak performance to maximize comfort and money savings.

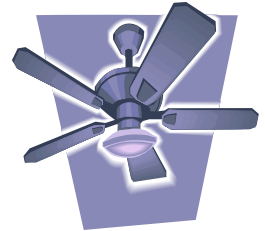


Each year, the cooling system's refrigerant charge and operating safety controls should be thoroughly checked out by an experienced, reputable air conditioning contractor. The contractor should perform the following services:

- Clean the outdoor condenser coil. Inspect the area around it to insure that it is free of debris and has an unrestricted air flow.
- Clean the indoor blower.
- Clean the evaporator coil.
- Balance the air and check the return vents.
- Change the air filter.

**Ceiling Fans**

Ceiling fans can serve a dual purpose- cooling rooms in the summer and supplementing heating in the winter.



Ceiling fans help lower winter heating costs when run in a clockwise, or updraft, direction. The hot air trapped at ceiling level is recirculated, allowing more even, comfortable heating while reducing winter bills by up to 10%.

**Closet-Size Boilers**



High efficiency wall-hung boilers and tank-less water heaters are sure-fire ways to manage fuel consumption and free up space.

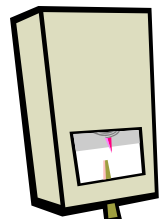
Approved for closet installation, the up to 99% efficient Baxi Luna boiler can cut fuel consumption of traditional heating and domestic hot water systems by between 35 and 53%. The appliance which is fired by natural gas or propane and has multiple heating zones, is compatible with all hydronic air handler applications for forced air heating, as well as in-floor baseboard radiators.

Baxi has made wall-hung boilers in Europe for more than 35 years. The Energy-Star boiler was introduced into the U.S. in the late 1990s. Purchasers should look for proof of product installation certification, as well as stamps of approval from the American Gas Association.

For more information, visit: [www.wallhungboilers.com](http://www.wallhungboilers.com).

**Interesting Gender Fact**

According to a poll of 1,5000 of its members ServiceMagic.com concluded that 55% of women control the thermostat in the home.



Also, 4% stated their pets get the most consideration, while only 1% said their children control the temperature.

**Air-Handler Maintenance**

As air-handlers age they become less efficient. In order to prolong their life and maintain efficiency, regular maintenance is important.



Some maintenance tips are as follows:

- Air Blowers– Remove soil/dirt build-up and corrosion from blower blades. Also, they remove any stagnant water.
- Filtration Equipment– Replace filters on a regular basis. Consider new high-efficiency filters with less static pressure.
- Cooling Coils– Use an alkaline detergent to clean aluminum coils. If heavy scaling is present, use an acid-based coil cleaner after the initial cleaning.
- Condensate Pans– Clean dust and debris from pans to avoid clogged drain lines.
- Ductwork– Inspect ductwork regularly for water damage, erosion and delamination (if not galvanized).
- Duct components– Inspect mixing boxes, reheat coils, VAV boxes and volume dampers over several years.

A complete guide to air-handling cleaning can be obtained from the National Air Duct Cleaners Association. Click on the following website to download a copy:

<http://www.nadca.com/publications/standardsguidelines.aspx>

**Motion Sensors**

Lights left on in unoccupied rooms can be a real energy waster. There is a simple way to prevent this– motion sensors.

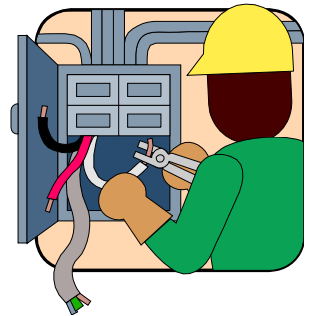


Motion sensors and proven lighting control technology can offer substantial savings in areas of moderate to infrequent activity, such as storage rooms, equipment rooms, and community spaces.

To further reduce lighting usage, daylight sensors can also be installed on all lighting that has direct access to natural light for a portion of the day, such as outdoor lighting, garage lights, and lights near windows or sky-

**Sub-metering**

Utility costs in most apartments buildings are tracked by master meters where costs are passed on to residents through fees, pro-rated according to unit size.



The best way to encourage conservation is to sub-meter units. Installing sub-meters in master-metered buildings usually results in an immediate drop in electrical consumption of about 18%, as residents become motivated to turn lights off to save on their bill. Sub-metering also acts as a catalyst for residents to install such conservation measures as compact fluorescent bulbs or energy-conserving appliances (if such equipment is not supplied in rental and owner-occupied units). Such strategies can bring the total reduction in load into the 30-40% range. The problem, of course, is balancing the cost of sub-metering with the savings.

Costs of \$800 per unit for metering equipment and installation are typical, and usually have long pay-back periods. However, there are two solutions. The first is to explore possible rebates from your local utilities as well as state and local conservation programs. The second strategy is to install wireless sub-metering radio-frequency technology where a private service would read the meter (without coming onto the property), bill, collect payments and report disbursements to the property owner or management agent.

**Energy Facts**

- The average American family will spend more than \$2,000 on home utility bills this year (American Council for an Energy-Efficient Economy).
- As much as 45% of home energy usage is dedicated to heating and cooling (Dept. of Energy).
- Turning back a thermostat 10-15% for 8 hours per day can cut annual heating bills by 10% (American Gas Association).



### **Best Energy Internet Site**

One of the best Internet sites on overall energy efficiency is Home Energy Savers at <http://hes.lbl.gov>. The site was developed by the Lawrence Berkeley National Laboratories Environmental Energy Technologies Division.



The Home Energy Saver is designed to help home owners and renters identify the best ways to save energy in their residences, and find the resources to make the savings happen. The Home Energy Saver was the first Internet-based tool for calculating energy use in residential buildings. The project is sponsored by the U.S. Department of Energy (DOE), as part of the national ENERGY STAR Program for improving energy efficiency in homes, with previous support from the U.S. Environmental Protection Agency (EPA), HUD's PATH program, and the California Energy Commission's Public Interest Energy Research (PIER) program.

About 750,000 people visit the HES site each year. Over 90% are homeowners and renters, but many third parties use the site as well.

The Home Energy Saver quickly computes a home's energy use on-line based on methods developed at Lawrence Berkeley National Laboratory. Users can estimate how much energy and money can be saved and how much emissions can be reduced by implementing energy-efficiency improvements. All end uses (heating, cooling, major appliances, lighting, and miscellaneous uses) are included. A detailed description of underlying calculation methods and data is provided in a series of special reports.

Home Energy Saver's Energy Advisor calculates energy use and savings opportunities, based on a detailed description of the home provided by the user. Users can begin the process by simply entering their zip code, and in turn receive instant initial estimates. By providing more information about the home the user will receive increasingly customized results along with energy-saving upgrade recommendations.

The Energy Advisor calculates heating and cooling consumption using the DOE-2 building simulation program (version 2.1E), developed by the U.S. Department of Energy. The program performs a full annual simulation for a typical weather year (involving 8760 hourly calculations) in about 10-20 seconds, after the user assembles the necessary information describing their home. Users can choose from 239 weather locations around

the United States. DOE-2 performs a very sophisticated series of calculations, but the web-based user interface is relatively simple and results are distilled into a useful form. Default energy prices for each fuel and state are also available, or users can enter a specific price of their choosing.

The Energy Advisor calculates domestic water heating energy consumption using a detailed model developed by LBNL researchers. Users can see how household size, age of occupants, equipment efficiencies, and water inlet temperatures affect bottom-line energy costs.

By simply entering the number and approximate age of their major appliances, users can estimate their energy consumption, based on historic sales-weighted efficiency data. A very detailed module is also included to estimate energy consumption for lighting and dozens of miscellaneous gas and electric appliances, with default values based on data compiled over the years by LBNL researchers.

The results pages provide a list of recommendations-ranked by payback time- tailored to the particular home being evaluated. The user can vary the energy efficiency assumptions in many cases, as well as the retrofit costs and then recalculate the table. The results can be viewed on line, and via a detailed printable report that includes retrofit description and other details as well as links to additional information.

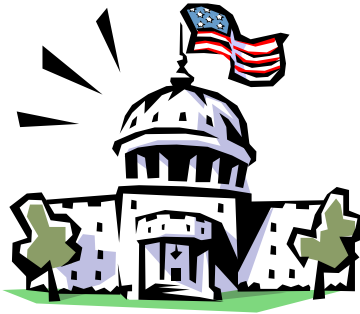
In addition to calculating energy use on-line, the Home Energy Saver's Making it Happen and Energy Librarian modules connect users to an expanding array of "how-to" information resources throughout the Internet. These modules help users successfully capitalize on the energy savings opportunities identified by the Energy Advisor module. Users benefit from a dynamic information base unparalleled by resources that could be published on static electronic media. These modules offer a host of links to practical information, ranging from lists of specific efficient products, to tips about selecting a good contractor, to information on what assistance your utility might have to offer. The site also features an extensive glossary and frequently-asked questions module.

Through special arrangement with Home Energy Magazine, the Home Energy Saver features extensive passages from the book No-Regrets Remodeling as part of the Making It Happen module.

The "Ask An Energy Expert Service" is also provided courtesy of USDOE's Energy Efficiency and Renewable Energy Network.

### **Energy Report to Congress**

HUD recently outlined its strategy for reducing energy costs and increasing energy efficiency in public and assisted housing, as required by the Energy Policy Act of 2005.



The report, Promoting Energy Efficiency at HUD in a Time of Change: Report to Congress, relates the steps HUD is taking - and proposes to take - to address rising energy costs in public and assisted housing, as well as in housing financed through formula and competitive grant programs. The report details how HUD is promoting, monitoring, and measuring efficient energy usage in public and assisted housing. Also included are the strategies that, in cooperation with the Department of Energy and the Environmental Protection Agency, will assist HUD's efforts to promote the cost-effective and efficient use of energy in the future.

The complete Report to Congress is available as a free download at: [www.huduser.org/publications/destech/energyefficiency.html](http://www.huduser.org/publications/destech/energyefficiency.html).

### **Curtain-wall Maintenance**

Curtain-wall systems— exterior non-load bearing walls that are attached to a building structure- have grown increasingly popular in building construction.

Routine inspections, however, are necessary to help identify problems that can compromise the weather barrier. In the November 2006 issue of Buildings, periodic curtain-wall checks were recommended. According to the article, a thorough check should include the following:

- Examination of gaskets or sealants for cracks.
- Inspection of the joints to determine if the framing components are letting in water.
- Evaluation of thermal insulation capabilities of the vision and insulation panels.

In addition to the above checks, a good maintenance program should consist of the following: regular cleaning, repair of minor defects, and the updating of records to document problems and solutions.

### **Solar Energy**

New Jersey is the 2nd largest producer of solar energy in the nation, and possibly the 5th largest in the world, according to the state Board of Utilities.



In keeping with this progress, the New Jersey Housing Mortgage Finance Agency (NJHMFA) has developed the Sunlit Program— the first state agency in the country to offer such a program. It provides financial incentives to developers to use solar energy systems when they construct or operate low-income housing units.

Under Sunlit, building owners and developers may earn tax credits, rebates on the cost of installation and renewable energy credits for every megawatt of renewable energy that a solar system generates.

Nearly 30 affordable and special-needs housing projects, representing more than 700 additional units, await approvals under the Sunlit program.

Currently, the New Jersey Board of Public Utilities offers rebates to owners of residential and commercial buildings for the installation of solar units. In addition, the owners of solar units receive certificates on the solar energy they produce. Utility companies purchase the certificates from individuals, who post them on the Internet for sale. Electricity suppliers e-mail their bids back to the solar owner. This allows them to meet a state mandate requiring the production of some of their energy from renewable sources.

For additional information, please visit the following websites: [www.njcep.com](http://www.njcep.com) and [www.state.nj.us/dca/hmfa/biz/devel/lowinc/soloarphotovoltaic.pdf](http://www.state.nj.us/dca/hmfa/biz/devel/lowinc/soloarphotovoltaic.pdf).

### **Themoplastic Polyolefin Roofs**

Themoplastic Polyolefin (TPO)-based products have been available since the 1980s; the first sheets for membrane roofing were introduced in 1989. By 1993, the earlier non-reinforced membranes were replaced by fabric-reinforced sheets, the version available today. The common choice for low-slope commercial roof systems from the 1800s through the 1990s has been bituminous multiple-ply systems. (An improved version of this type of roofing is the polymer-modified



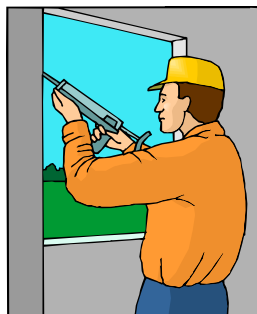
bituminous roof). For a variety of reasons, including economic, social, and performance considerations, the conventional built-up roof system represents less than 30% of the roofs now being installed. Major factors have been the cost of petroleum and the difficulty of finding skilled laborers willing to work with hot asphalt.

TPO roofs use the latest technology. They are desirable due to cost considerations, ease of fabrication, and potential for improved performance. As compared to vulcanized EPDM rubber, TPOs can be welded and reprocessed like other thermoplastics. Yet by containing EP rubber within the TPO, low-temperature flexibility is very good. By not needing plasticizers (required by PVC and CPE), shrinkage and aging through plasticizer loss is less of a factor. The absence of chlorine in the polymer chain suggests that these membranes may be “greener” than those that contain chlorine. They are also available in lighter colors (usually white, off-white, or beige). This is a strong advantage in hot climates where ENERGY STAR® or urban heat island considerations must be met.

An excellent reference on in-service TPO performance was published in *ASTM Special Technical Publication 1349*, dated 1999. It is available at: [www.astm.org](http://www.astm.org).

### **Improved Caulking Materials**

Building designers and owners will soon be able to choose caulking products with known performance attributes, thus improving durability, reducing water leakage and lowering costs of maintenance, thanks to a research project being conducted at the National Institute of Standards and Technology (NIST) to evaluate caulking durability. This project is supported by the Partnership for Advancing Technology (PATH), which is managed by the Office of Policy Development and Research.



There is currently no accepted, analytical method for predicting the durability of caulking material. As a result, builders have a hard time choosing a caulk that will provide best value to the owner. Working with the caulking industry, NIST has developed a test device called the SPHERE (Simulated Photodegradation via High Energy Radiant Exposure) that exposes caulking samples to high intensity sunlight (up to the intensity of 50 suns) at controlled temperature and humidity. This two- to three-week controlled test replaces the unreliable 26-month exposure period that is currently in use.

PATH has been supporting this effort because a predictable service life of construction materials will make selecting high performance products much easier. Building designers and owners will be able to choose products with known performance, thus improving durability, reducing water leakage, reducing energy consumption and lowering costs of maintenance. Reduced water leakage, for example, helps properties remain drier and healthier for America’s families.

### **Occupancy Sensors**

An often overlooked way to save on energy is to utilize occupancy sensors.

These sensors are basically sophisticated off/off switches and are composed of three main types: passive infrared (detects body temperature), ultrasonic (detects high frequency sound) and dual technology (combines passive infrared and ultrasonic). Although the later is the more expensive type of sensor , it has the fewest instances of false triggering.

The sensors should be either wall-mounted or ceiling-mounted. Wall-mounted sensors should be installed in smaller spaces (e.g., bathrooms, offices, copier rooms) and ceiling-mounted sensors in larger “open” areas.

Lastly, maintenance staff and residents should be trained to report any instances of false triggering.

### **Best Practices for Builders**

The Dept. of Energy’s Building America program has released the 5th and final volume in its handbook series on regional best practices for builders and homebuyers.



The new volume, "Builders and Buyers Handbook for Improving New Home Efficiency, Comfort, and Durability in the Marine Climate," provides energy efficiency tips and outlines steps for builders in the marine climate zone to reach 30% energy savings in space heating and cooling and water heating. The marine climate zone is a narrow band on the west coast of North America that runs from the Canadian border south to the border between Ventura and Los Angeles counties in California.

The handbook includes chapters for each member of

the building team, including homeowners, managers, marketers, site planners, designers, and site supervisors. Real-life case studies highlight the energy efficiency efforts of builders in the marine climate zone. The handbook is the last in the series on best practices in the five climate zones. The previous four volumes addressed best practices in hot-humid climates, hot-dry and mixed-dry climates, cold and very cold climates, and mixed-humid climates. The handbooks can be downloaded from the following website: [http://www.eere.energy.gov/buildings/building\\_america\\_for\\_builders](http://www.eere.energy.gov/buildings/building_america_for_builders).

### **Energy Saving Washers**



Horizontal-axis washers, long popular in Europe, use 50% less energy than standard top-loading washers, due to reduced hot water consumption. They also use 40% less water (20-25 gal. per fill instead of 40 gal.), cause less wear and tear on clothes, and can accommodate larger

items.

### **Solar Hot-Water Heaters**

Solar hot-water heaters come in a variety of configurations. Most have backup water heating with electricity or gas.

A solar heating system usually consists of a hot-water storage tank, a solar collector that absorbs energy, the backup up energy source, and sometimes pumps and controls.

Passive heating systems consist of a water tank integrated into or located above a solar collector. Forced-circulation systems require a pump to move the water from the storage tank to the collector. Most solar water heaters in the U.S. are the forced-circulation type.

An active, flat-plate solar-collector system will cost \$2,500-\$3,500 installed. It will produce 80-100 gallons of hot water per day. A passive system will cost \$1,000-\$2,000 installed but will have a lower capacity.



### **Combined Heat & Power (CHP) Generation**

CHP technologies, sometimes called cogeneration, have provided heat and electrical energy efficiently at commercial and industrial sites for many years. Now, after hundreds of successful residential installations in Japan and Europe, several manufacturers are offering systems that are that is practical and affordable. Unit costs for 2-6 kilowatt systems range from \$10,000 to \$20,000.

### **Induction Cooktops**



New technology offers energy-efficient cooking that allows changes from extremely low to extremely high temperature settings and back again nearly instantly. The cooktop does not get hot or radiate heat. Heating elements underneath its ceramic-glass surface use electricity to produce a magnetic field that heats only the

cooking container.

Food heats much faster- in fact, induction cooking is about 90% more energy efficient. Gas and electric stoves are only about 50 and 60% efficient.

New technology, however, does not come cheap. Price ranges for the induction cooktop ranges from \$1,800 to \$4,000.

### **Super-sized Insulated Concrete Forms**

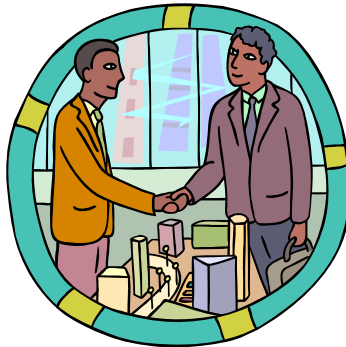
Insulated concrete forms are becoming more widely used in construction to make buildings more energy efficient. In addition to having all of the energy efficiency and strength of conventional insulated walls, these go up faster because fewer pieces are assembled on site. The cost of the material ranges from \$1.75 to \$3.50 per square foot (installation labor, reinforcement, bracing, and concrete placement are additional expenses).

### **Safety Glass/Coatings**

Laminated safety glass can increase the cost of standard glass by 50%. Windows with laminated glass capable of withstanding hurricane-force winds can add cost three times the price of a standard window. Low-emissivity coatings used to add about \$1 per square foot of glazing, but in most climates this has become standard. Solar-control coatings may be incurring a similar surcharge, but they have been moving toward the standard in some markets.

**EMAP Program**

The Environmental Management Assistance Program (EMAP) was established in 1997 by the Pennsylvania Small Business Development Centers, as a no-cost resource, to provide environmental assistance to small businesses statewide. It is funded, in part, by the Commonwealth of Pennsylvania, the PA Departments of Community and Economic Development and Environmental Protection, the U.S. Small Business Administration, and the participating colleges and universities.



EMAP's Environmental Specialists are located throughout Pennsylvania. Among the services provided is one-on-one consulting regarding energy efficiency.

Specifically, EMAP offers a step-by-step program to help small businesses recognize and realize energy and cost savings. The program includes: analyzing current usage, visiting and testing the facility, providing recommendations for cost savings, and assisting with finding sources of financing. As a result, businesses are able to make sound investments leading to real savings in monthly operating expenses.

If you would like to hear back from a consultant on a specific topic, please call (877) ASK-EMAP or send an e-mail at: [www.askemap.org/request.html](http://www.askemap.org/request.html).

**Best Practices**



This compilation of articles from past issues of Philadelphia Multifamily Hub News, are practical ideas that you, our project owners and managers can implement to conserve energy and minimize utility costs.

We are certain, however, that many of you have already implemented many of these suggestions, as well as other innovative ideas.

It would be a tremendous benefit if these ideas could be

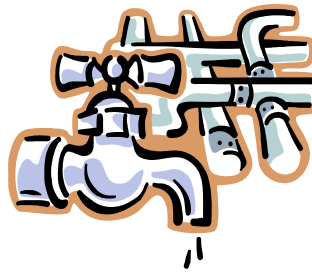
shared with members of the multifamily housing industry. If you are willing to provide a narrative discussing the measures that your project has taken to reduce energy consumption, we will highlight your efforts in a future issue of Philadelphia Multifamily Hub News

Please send your narratives by e-mail (Word attachment) or mail to:

Thomas\_Langston@hud.gov, or

U.S. Department of Housing and Urban Development  
 100 Penn Square East  
 The Wanamaker Building  
 Philadelphia, PA 19107  
 Attn: Thomas Langston, Director of Operations

**Faucets & Water Conservation**



Rising water and sewer costs have caused many owners to pursue water conservation strategies.

One simple way is to replace older (prior to 1994) water faucets with flow rates of 3-5

gallons per minute with new faucets with rates of 2.2 gpm. If that is not practical, low-flow aerators can be purchased for under \$10 each.

Public "high-traffic" washrooms can also be made to conserve water by upgrading to metered (i.e., self-closing) and electronically-activated sensor faucets. While there is a premium for sensor technology, the added sustainability benefits and potential savings outweigh the costs.

**Energy Tip**

PECO (Philadelphia Electric Company) states that a 10° decrease in a thermostat setting will result in a 3-5% energy savings.

**Lighting Fact**

Everyone knows that compact florescent light bulbs (CFLs) save energy, but did you know that you also save on replacement costs? CFLs can last 7,500 to 10,000 hrs. while incandescent bulbs last 1,000 hrs.

### **Washing Machine Energy Tips**

The typical washing machine churns and spins about 13,000 gallons of water a year, according to the American Water Works Association research Foundation. That is about 22% of the average family's annual water consumption. Washers and dryers account for 10% of home energy costs.



Thanks to new government standards, washers are getting more efficient. In fact, machines that qualify for Energy star rating- the level required for government energy rebates- must be 37% more efficient than minimum standards.

Generally speaking, front-loading washers offer the greatest efficiency. They extract more moisture from laundry during the spin cycle, which means it takes less time and energy to dry.

The typical life span of a machine is 12 years. You can still save money and conserve energy even if your washer is years from retirement by taking these steps:

- Choose the lowest water temperature that will get the job done.
- Only operate the washer with full loads of laundry. Set the machine on the fastest spin speed so it can whirl as much water out of the wash as possible.

Another tip is to wipe the moisture sensor of your dryer (located inside the front edge of the drum) with rubbing alcohol to prevent tumbling clothes after they are dry.

For additional tips on saving energy and money, see:

[www.GreenerChoices.org](http://www.GreenerChoices.org)

### **HVAC Preventative Maintenance**

A Preventative Maintenance Agreement (PMA), purchased through a reputable, licensed, and insured HVAC contractor, can extend the life of your heating, ventilation and air-conditioning system and save you money.

Similar to performing regular maintenance on your car, maintenance on your HVAC system can help it provide years of optimal comfort for your residents.

With a PMA, which is usually offered for a yearly fee, a technician will come to your property twice a year to test

and inspect your HVAC system before any minor issues (e.g., refrigerant leaks, soot, rust, corroded electrical contacts, etc.) turn into major problems.

Another all-inclusive option is a lifetime PMA that includes the cost of all maintenance, repairs, components, emergency service, and equipment service.

### **Hybrid HVAC Systems**

With energy costs on the rise, property owners are looking for ways to save money on their heating and air conditioning bills without sacrificing comfort.

One option, is to install a hybrid comfort system. This dual-fuel system allows property owners to switch between two heating technologies to provide the most comfortable indoor air and the chance to save money on cold weather utility bills.

During mild days, an electric heat pump can be used as the primary heat source, and on the coldest days, when outdoor temperatures drop to a point where the heat pump is no longer efficient, a high-efficiency gas furnace, instead of an electric resistance heater, provides supplemental heat.

This hybrid system helps insure comfortable indoor temperatures while balancing the utility load between electricity and natural gas. By taking advantage of the most economical source of heat based on weather patterns, a savings up to 40% can be realized on utility bills. Also, the heat pump can provide high-efficiency air conditioning during hot weather.

Additional savings can be obtained through utility incentives offered by power suppliers and federal tax credits.

### **Energy Efficient Refrigerators**

Did you know that refrigerators with bottom freezers are more energy efficient? This is because cold air settles downward. You are fighting gravity by having a freezer on top. Also side-by-sides are less efficient in part because the configuration allows for less insulation.

### **Light-Colored Roofs**

Light colored roofs can save a property owner money because they reflect heat, thereby reducing a building's energy needs. Also, light-colored shingled roofs need less repairs and less frequent replacements because the heat absorbed by dark roofs makes shingles expand– and ultimately break.





## **Furnaces & Boilers**

Most properties are heated with either furnaces or boilers. Furnaces heat air and distribute the heated air through the house using ducts; boilers heat water, providing either hot water or steam for heating.

Steam is distributed via pipes to seam radiators, and hot water can be distributed via baseboard radiators or radiant floor systems, or can heat using a coil.

Steam boilers operate at a higher temperature than hot water boilers and are inherently less efficient, but high efficiency versions of all types of furnaces and boilers are currently available.

A central furnace or boiler's efficiency is measured by annual fuel utilization efficiency. The Federal Trade Commission requires new furnaces or boilers to display their AFUE so consumers can compare heating efficiencies of various models. AFUE is a measure of how energy efficient the appliance is with its fuel over the course of a typical year.

Specifically, the AFUE is the ration of heat output of the furnace or boiler compared to the total energy consumed by a furnace or boiler. An AFUE of 90% means that 90% of the energy in the fuel become heat for the residence and the other 10% escapes up the chimney or elsewhere.

AFUE does not include the heat losses of the duct system or piping, which can be as much as 35% when ducts are located in an attic.

All al-electric furnace or boiler has no flue loss through a chimney. The AGUE rating for n all-electric furnace or boiler is between 95-100%. The lower values are for units installed outdoors because they have greater jacket heat loss. However, despite their high efficiency, the higher cost of electricity in most parts of the country, makes all-electric furnaces (except heat pumps) or boilers an uneconomic choice.

The minimum allowed AFUE rating for a non-condensing fossil-fueled warm-air furnace is 78%; the minimum for a fossil-fueled boiler is 80%; and the minimum for a gas-fueled steam boiler is 75%.

A condensing furnace or boiler condenses the water vapor produced in the combustion process and uses the heat from this condensation. The AFUE rating for a condensing unit can be more than 10% higher than a non-condensing furnace. Although they cost more, they can save money over their 15-20 year life, especially in cold climates.

## **Repair or Replace Air Conditioner System?**

When is it time to repair or replace your existing air conditioning system?

When heating, ventilating, air-conditioning (HVAC) systems are newer, performing simple repairs is usually more cost effective and will often prolong the life of the system.

Conversely, older systems may experience more complicated problems in which repairs are possible but may not be the best choice in the long run. To decide, you should compare the cost of repairs versus the cost of replacement.

Experts suggest the following things to examine when it comes to your HVAC unit:

1. Consider energy costs. Today's air-conditioning systems are up to 60% more energy efficient than systems manufactured 10 years ago (up to 15+ SEER).
2. The nature of the repair. Repairs that require replacement of system components may result in an unmatched system, which can decrease system efficiency, compromise comfort, and shorten the compressor life span.
3. If repairs to an immediate problem will not address ongoing comfort issues, such as cold spots, drafts, humidity, or air-quality concerns, these are good indicators that it is time for a new system.

### Energy-Efficient Bathrooms

Bathrooms can be responsible for a significant amount of a property's annual utility bills. They require both hot and cold water, heating and cooling, and electricity for lighting and appliances (e.g., shavers, hair dryers, etc.). If they have exhaust fans, bathrooms draw out the indoor cooled or heated air.

There are several steps that property owners can take to make bathrooms more energy efficient. They are as follows:

- Install 1.6 gpf (gallons per flush) super-efficient standard flush toilets.
- Install water-saving showerheads that have trickle valves to slow the water flow while you are lathering. Also, install ones that have either manual or electronic shower valves that allow the temperature to be set on a dial or digitally.
- Install a rapid-hot-water demand kit underneath the sink to get hot water rapidly to the shower or sink. Instead of the cold water running down the drain while you are waiting, it flows back into the water-heater tank.
- Install an electric radiant floor or wall heating system on a timer.
- Install a high-quality bathroom vent fan with humidity and motion-sensing controls. It runs only as long as it is needed, so excessive heated or cooled air is not sucked from the property.

Select a fan with a light fixture and install full-spectrum compact florescent bulbs, which are energy-efficient and produce natural light for applying makeup.

### Energy Star Lighting

By now, everyone knows the advantages of energy star products and lighting. However, did you know that not all energy-efficient lighting is created equal?

Project owners and managers should consult with vendors who have a lot of experience with energy-efficient lighting and understand what separates the good from the less-than-average products.

They should also ask to see a vendor's complete selection and ask tough questions about color rendering, life-span, durability, efficacy, starting, and independent laboratory verification of the product's efficiency and performance.



### AFUE Heating Efficiency

The Federal Trade Commission requires new heating furnaces or boilers to display their Annual Fuel Utilization Efficiency (AFUE) rating so that consumers can compare heating efficiencies of various models.

AFUE is a measure of how efficient the appliance is in the energy in its fuel over the course of a typical year (not its electricity usage). Specifically, AFUE is the ratio of heat output of the furnace or boiler compared to the total energy consumed by a furnace or boiler. An AFUE of 90% means that 90% of the energy in the fuel becomes heat for the home and the other 10% escapes up the chimney and elsewhere. (Note: AFUE does not include heat losses of the duct system or piping, This can be as much as 35% of the energy for output of the furnace when ducts are located in an attic).

A good analogy is the miles per gallon that a car receives. Simply put, furnaces usually are not as efficient when they are first firing up as they are running at steady rate- sort of like a car getting better mileage in steady highway driving than in stop-and-go city traffic. What matters over the course of the year is the total useful heat the furnace delivers to your property vs. the heat value of the fuel it consumes. This is like measuring the gas mileage your car gets by asking how many miles you drove this year and dividing it by how many gallons of gas you bought.

The US Department of Energy (DOE) [determined](#) that all furnaces sold in the US must have a minimum AFUE of 78%, beginning January 1, 1992. Mobile home furnaces are required to have a minimum AFUE of 75%. Old gas furnaces, those installed prior to 1992 have an efficiency rating of 65% (the least efficient systems today are 80%). Similarly, the ratings of old boilers are only 55-65%.

If a furnace is old it should be replaced with one with the highest efficiency. The ENERGY STAR® logo helps you quickly find those with an AFUE of at least 90%. The highest efficiency models can cost a little more up front, but they will save on fuel bills. For example: If you are spending \$500 per year on gas for heating today with a 65% furnace, replacing it with a 95% efficient model instead of a run-of-the-mill 78% efficient model will save you around \$75/year in gas costs. The higher installation cost can be paid back in a few years. Also, over the next 20 years, the high-efficiency model will mean that 30,000 pounds less carbon dioxide (CO<sup>2</sup>) gets dumped in the atmosphere.

### **Section 8 Pilot- Green Initiative**

HUD has rolled out a nationwide pilot program to encourage owners of multifamily Section 8 properties to rehabilitate and operate their buildings using "green building" principles that embody a combination of sustainability, energy efficiency, recycled materials, indoor air quality, and incorporate the healthy housing approach pioneered by HUD's Healthy Homes Initiative.



Green building practices are designed to lower utility costs, thereby benefiting taxpayers, property owners, and the residents of the buildings themselves. When rehabilitation is performed in a manner that meets both green and Healthy Housing principles, residents can also benefit through improved indoor air quality, lower risk of pest infestations, lower levels of allergens, and reduced risk of mold-related illness.

The Green Initiative will be implemented on properties within HUD's Section 8 portfolio, specifically properties in the Mark-to-Market (M2M) Program, that have not yet executed a Restructuring Commitment. Participation in the Initiative will be voluntary for eligible property owners.

The Initiative includes the following three key features: 1. The owner makes a minimum commitment to certain Green improvements and agrees to implement a Green Operating and Maintenance Plan for the term of the Use Agreement, 2. OAHAP classifies Green rehab and improvements as significant additions, and 3. The Plan includes components for Resident Outreach, Training, Incentives, and Integrated Pest Management.

The M2M Program is a unique platform for establishing HUD's Green Initiative because it can be implemented within existing statutes, regulations, and current budget authorities. M2M affords HUD the opportunity to fund these efforts in a representative sample, which is already undergoing rehabilitation.

M2M provides an opportunity to test the impact of green and Healthy Housing principles in the existing HUD-subsidized multifamily inventory, by providing modest incentives to owners and purchasers to perform needed rehab and maintenance using Green alternatives, and to collect ongoing data to validate impacts on utility consumption and indoor air quality.

Currently, under M2M, HUD finances 80% of most rehab items, and 97% of certain significant additions to the

property. Under this initiative, HUD will designate substantially greener materials, appliances, systems, etc. as "significant additions."

As one of HUD's primary housing preservation tools since its creation in 1997, OAHAP has restructured over 1,600 projects nationwide through M2M. These projects are privately owned, HUD-subsidized (through Section 8), multifamily properties, with approximately 100 units each, on average. In addition to rehabilitation of properties, M2M also resizes and restructures property debt to account for market rent levels (to pay for rehabilitation and 20 years of estimated repairs and replacements), and to establish a financially viable project for the long term.

### **Florescent Dimming Systems**



It is a widely known fact that florescent bulbs are cheaper to operate than incandescent bulbs. This type of lighting, however, can be made even more energy-efficient by adding dimmers. When used correctly experts estimate that a lighting system can reduce lighting energy consumption by 50% in existing buildings and at least 30% in new construction.

Dimming systems can reduce utility costs through "daylight harvesting," demand reduction, scheduled dimming, and other strategies. Simply stated, users select light levels based on their needs.

The essential part of every linear florescent and compact florescent system is the electronic ballast. The ballast provides the starting voltage to ignite the lamp and regulate the current flowing through the lamp after start-up. To achieve dimming, the ballast is designed so that it can receive a control signal from a dimmer as an input and adjust the current flowing through the lamp as output. This results in the dimming effect.

Primary dimming methods include analog, which is the most popular, and digital, which is still emerging.

To learn more about this technology see:  
[www.aboutlightingcontrols.org](http://www.aboutlightingcontrols.org)

## LED Technology

Light-emitting diodes (LED), semiconductor diodes that emit incoherent narrow-spectrum light, have been around for a while in the form of pilot lights, exit lights, night lights, landscape lighting, traffic lights, etc. Originally, used as faint red indicator lights on electronic devices, LEDs blossomed in 1995 when researchers discovered how to make white electroluminescent light in the semiconductor. Gradually they have become more useful as new technologies have allowed their brightness to be ramped up (i.e., over 60 watts) and their use expanded as a regular household light source.

Lighting designers predict that there will be an explosion in the LED market within the next five years. The technology has improved to provide enough light at a fraction of the cost when oil is pushing \$100 per barrel and consumers are beginning to take the energy crisis seriously. Now, kits are available to retrofit existing recessed lighting in residences to accept LEDs. The potential applications for illumination are endless. Every time a light bulb is changed, particularly in a lobby or a large public space, it costs time and money. Depending how long the light is left on, that cost is either eliminated with LEDs or substantially reduced.

Consumer Reports stated in its November 2007 issue that LEDs, in some cases, are four times more energy-efficient than incandescent bulbs, and are also longer lasting and safer- because they are made of plastic and are cooler to the touch. On the down side, however, LEDs are not as bright and they presently are more expensive.

Like the Energy Star® rating, some companies manufacturing LEDs have begun using a new rating system based on the amount of greenhouse gases saved by using LED lights over standard incandescent bulbs. The labeling system is sanctioned by the Carbon Credit Co. and uses "carbon credits." Carbon credits are the equivalent of 1 metric ton of carbon dioxide emitted from the use of fossil fuels. Savings from LEDs range from ½ to 3 carbon credits per light.

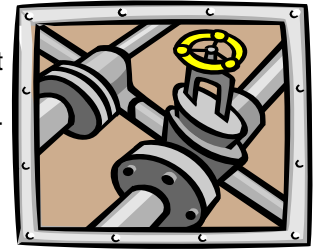
Businesses or individuals interested in determining their "carbon footprint," the total amount of carbon dioxide and other greenhouse gases emitted through the combustion of fossil fuels over the full life cycle of a product or service (i.e., such as a car or air conditioner), can log onto the following websites:

[epa.gov/climatechange/emissions/ind\\_calculator.html](http://epa.gov/climatechange/emissions/ind_calculator.html),  
[www.terrapass.com](http://www.terrapass.com), or [www.climatecrisis.net](http://www.climatecrisis.net).



## Geothermal Systems

The EPA has called geothermal systems "one of the most efficient and comfortable heating and cooling technologies currently available." Geothermal heat pumps use the relatively constant temperature of the ground or surface water as a heat source and sink for a heat pump, which provides heating and cooling for buildings.



The typical installation is a vertical closed-loop system that can reach depths of 150-300 feet. Horizontal systems are less expensive but do not transfer as much heat.

In the winter, the liquid in the system's pipes absorb heat and carry it to coils in a heat exchanger. The heated air is distributed through the residence via traditional ductwork. In the summer, the flow reverses, carrying hot air down and transferring cool air up to a condenser, compressor and evaporator- the same basic components as a refrigerator- where air is chilled and dehumidified. Most systems also eliminate the need for a separate hot water heater.

The transfer of heat is powered by an electric heat pump and generates 4-5 kilowatts of heat for every kilowatt of electricity used, according to ClimateMaster, a manufacturer of geothermal units.

Although geothermal systems have been around for almost 20 years, and their energy savings are obvious, the current drawback is the initial drilling and installation cost. The EPA estimates that it takes 3-5 years for the energy savings to make up for the additional cost.

A new method in development by the Dept. of Energy's Building Technologies program, however, could drop the price of geothermal systems by placing the geothermal loops in the building's foundation and eliminating the need for costly drilling.

For more information see the following DOE and EPA websites:

[www.eere.energy.gov/states/alternatives/geothermal\\_heat\\_pumps.cfm](http://www.eere.energy.gov/states/alternatives/geothermal_heat_pumps.cfm)

[www.epa.gov/ne/eco/energy/re\\_geothermal.html](http://www.epa.gov/ne/eco/energy/re_geothermal.html)

**Energy Report Card**

Energy conservation applies to everyone- tenants, project owners, and even the Federal government. Starting this month, the administration plans to grade how well agencies meet the following energy conservation mandates, using a color-coded scorecard:



*New Mandates*

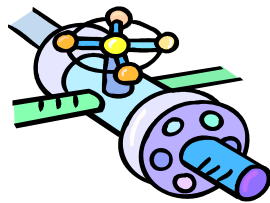
- Reduce energy use by 3% annually and 30% by 2015.
- Reduce water consumption by 2% annually.
- Purchase 50% of renewable energy from new sources.
- Increase alternative fuels use by 10% annually.
- Insure, by 2015, that 15% of all buildings are sustainable (i.e., high environmental standards are incorporated into a building’s design, construction, maintenance and deconstruction.
- Purchase “green” electronic equipment 95% of the time.

*Pre-existing Mandates*

- Purchase 3% of electricity from renewable sources.
- Reduce petroleum use by 2% annually and 20% by 2015.
- Insure new building designs are 30% more energy efficient than 2004 standards.

**Hidden Costs of Hard Water**

It is common knowledge that hot water heaters, boilers, and plumbing equipment must be maintained to keep a building operating at peak performance and profitability. Hard water in some localities can prevent this from happening.



Hard water contains dissolved rock and accumulates on heating elements and the internal surfaces of boilers, causing scale build-up and impairing efficiency. Scale build-up reduces the equipment’s ability to heat surrounding water, causing it to consume more energy and raise utility costs. According to the American Society of Plumbing Engineers, 1/16-inch of scale can reduce energy consumption by 11%.

Problems associated with hard water can easily be

minimized by using a water softener, which reduces scale forming or hardness ions (calcium and magnesium). This helps prevent scale build-up and overheating of hot water-using equipment. Using soft water saves money on electricity and gas, as well as 35% on detergent/chemical costs. It also reduces equipment maintenance repair downtime by 25% and extends equipment lifespan. (Source: Buildings, January 2008).

**Lesser Known Energy Wasters**

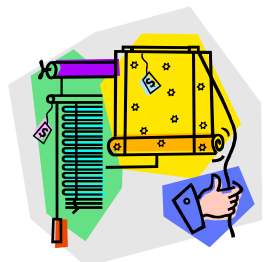
By now, everyone is aware of ways to save energy. However, if you are serious about saving additional energy, make sure the following wasteful practices are avoided:



- Leaving electronics and appliances turned on or not in “sleep mode.” (Shutting off one computer/monitor can save \$80/year).
- Dirty HVAC filters. (Cleaning/replacing one filter can save \$5/month).
- Dripping faucets. (Fixing one faucet can save \$30-\$120/year).
- Dirty windows and skylights that block sunlight.
- Not optimizing equipment start-up time and sequencing (i.e., not spacing the start-up of equipment 30 minutes apart during peak demand hours).
- Thermostats mounted in the wrong locations (i.e., exposed to sunlight, drafts, vents, pedestrian traffic, etc.).
- Exhaust fans that constantly run.
- Blocked air flow from vents and grills being covered up.
- Incandescent exit signs instead of LEDs. (LEDs can save \$24 per yr. for one sign).

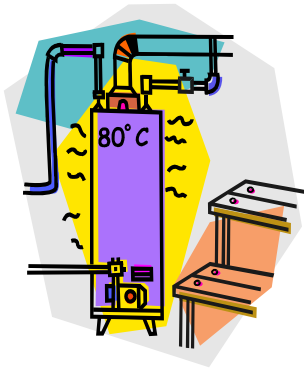
**Energy Saving Tip**

Window treatments should not be overlooked as a way to save on energy costs. Tight-fitting window shades made with side tracks and reflective material that faces the glass carry high R values due to their insulation properties. This can significantly reduce heat loss from windows where 20 times as much heat is lost as a well-insulated wall.



### Hybrid Hot Water Heater

It is acknowledged that tankless hot water heaters save energy because they heat water without the aid of an inefficient water storage tank. Instead, the tankless unit warms cold water resting in the copper coils when it senses demand. This type of unit, however, has two drawbacks– the process is not instantaneous, a 200 amp circuit is required and water flow can diminish as more water is needed (e.g., using two shower heads instead of one).



To eliminate these problems, hybrid water heaters have been developed. These units use both tank and tankless technologies. For example, although the hybrid has a water storage tank, it contains only a few gallons of water. Having only a few gallons to keep heated, the hybrid uses minimal energy to keep the stored liquid up to temperature. It offers several advantages:

- Hot water is always available. No waiting for water in coils to heat up.
- The variable intensity burner system is computer controlled to provide as much heat as is needed based on the demand.
- It allows for a water recirculating system, unlike tankless heaters.
- It has stainless entrails, not copper– so where a tank-type water heater has a 3-year warranty and a tankless water heater warranty tops out at 10 years, the new hybrid units goes for 20 years.

### Mercury Risk & Compact Bulbs

More than 290 million compact florescent bulbs (CFLs) were sold in 2007– more than double the number in 2006. Sales of these energy-efficient bulbs, which now make up 20% of the U.S. light bulb market, are rapidly growing.

The reason is simple. They use about 75% less energy and last up to 10 times longer than traditional incandescent bulbs.

However, people should be aware that they pose a small risk of mercury poisoning to infants, young children and pregnant women if they break.

Mercury is needed for the lamps to produce light– there are no known substitutes. No mercury is emitted when compact florescents are burned, but a small amount is vaporized when they break (bulbs contain 1-30 milligrams

of mercury). This can happen if they are dropped or when people screw them in holding the glass instead of the base. In many cases, immediately after a bulb is broken– and sometimes even after clean-up was attempted– levels of mercury vapor exceeded federal guidelines for chronic exposure by as much as 100 times.

The chemical mercury is a naturally occurring metal that accumulates in the body and can harm the nervous system of a fetus or a young child if ingested in sufficient quantity.

The Maine and Vermont-based Mercury Policy Project recommends the following clean-up procedures for broken bulbs:

- Keep people and pets away.
- Open windows and leave the area for 15 minutes before clean-up is started.
- Do not use a vacuum cleaner. This will spread the mercury vapor and contaminate the vacuum.
- Wear rubber gloves.
- Carefully remove the larger pieces and place them in a secure closed container, preferably a glass jar with a metal screw-top lid and seal like a canning jar.
- Scoop up the smaller pieces and dust using two stiff pieces of paper, such as index cards or playing cards.
- Pick up the fine pieces with duct tape, packing tape, or masking tape, then use a wet wipe or a damp towel.
- Place all waste into the glass container, including all material used in the clean-up.
- Remove the container from your residence and call the local solid waste district for disposal instructions.
- Continue ventilating the room for several hours.
- Wash your hands and face.
- Consider discarding throw rugs or the area of the carpet where the break occurred.
- Open windows the next several times you vacuum to provide good ventilation.

Overall, however, the advantages of CFLs far outweigh their disadvantages. Consumers should know how to safely dispose of them and should continue to use them until mercury-free alternatives are available.

### Is Your Building Haunted by “Phantom Load?”

Your building is probably haunted by “phantom load.” This is the small but not insignificant amount of energy that some appliances- including televisions, clocks, cordless telephones, rechargeable razors, timers, temperature gauges, power adapters, cell phones, digital cameras, power tools, computer monitors, printers, VCRs, DVD players, stereos, answering machines, microwave ovens, and instant-on appliances, etc.- are sipping away 24 hrs. a day when they are turned off. It's definitely a little spooky. You can take some simple steps to reduce the financial and environmental impact from these “vampire” appliances. Unplugging devices is the simplest way to solve the problem, but can be a hassle. Plugging a couple of your devices into a \$35 power strip with an on/off switch -is often the only way to avoid this waste of power. It's enough to make you wonder what else is going on when your back is turned! This simple change can save \$94 a year on electric bills by eliminating phantom load energy drain that accounts for 5% to 15% of a home's electricity bill. Also, carbon emissions will be reduced by 1,430 lbs. a year.



Although the power needed for functions like displays, indicators, and remote control receivers is only in the milliwatt range, power supplies that are used to convert the AC line voltage to the low voltage needed to perform the functions typically operate at very low efficiency when they are operating at low power. As a result, the power consumed from the mains is often in the range of 1 W to 10 W or more, even when only a few tens of mW or less are needed. Standby power typically 10 to 15 watts per device, and occasionally more. For any single appliance the load is never very large (the most inefficient designs draw 15-20 watts), however when factored over all of the appliances in a country like the U.S. the load can come to billions of watts. Some studies have suggested that the total phantom load caused by the United States alone would provide enough power to handle the electric needs of Vietnam, Peru and Greece.

Finding phantom loads is not always easy. “Gas” stoves that use an electric clock constitute a phantom load. Recommended methods for finding phantom loads include turning off all lights at night and looking for any LEDs or other glows in the house. Any device that requires resetting after a blackout or power surge is a cause of phantom load. “Instant on” features are often an indicator of phantom load.

Alan Meir, a staff scientist at the Lawrence Berkeley

National Laboratory, noted that many household appliances are never fully switched off, but spend most of the time in a standby mode. His 1998 study estimated that standby power consumption accounted for approximately 5% of total residential electricity consumption in America, “adding up to more than \$3 billion in annual energy costs”. According to the Department of Energy, national residential electricity consumption in 2004 was 1.29 billion megawatt hours (MWh)-5% of which is 64m MWh. The wasted energy, in other words, is equivalent to the output of 18 typical power stations. His 2000 study showed that standby power accounted for around 10% of household power-consumption.

A similar study in France in 2000 found that standby power accounted for 7% of total residential consumption. Further studies have since come to similar conclusions in other developed nations, including the Netherlands, Australia, and Japan. Some estimates put the proportion of consumption due to standby power as high as 13%.

Now that you know about the “phantom” living in your building, you should take steps to eliminate him and save on your energy bill.

### Power Purchase Agreements

Businesses and homes are installing solar panels on their buildings for a fraction of the cost of only a few years ago.



This is due to the emergence of Power Purchase Agreements (PPAs). PPAs aim to overcome solar's obstacles— high up-front costs and design and maintenance problems— and deliver systems to millions of customers.

Basically, a company will supply and maintain a solar system at minimal or no cost, by charging customers for the power they use— much like a utility. Yet, unlike a utility, these firms typically charge less than standard electric rates.

Solar energy has grown at least 45% each of the past two years. It has become more widely accepted because it emits no global-warming gases, and provides power mid-day, when demand and electric prices are high.

## Central Air Conditioning

The following are several buying and installation tips for central air conditioning units:

### *Buying Tips (things to look for)*

- Highest SEER possible (as of Jan. 23, 2006, all units must achieve a SEER of 13 or higher.
- Thermal expansion valve and a high-temperature rating greater than 11.6.
- Variable speed air handler for new ventilation systems.
- Quiet operation.
- A fan-only switch, so you can use the unit for night-time ventilation to substantially reduce energy costs.
- Automatic-delay fan switch to turn off the fan a few minutes after the compressor turns off.



### *Installation*

- Allow for adequate indoor space for future maintenance and repairs.
- Install an access door in the furnace or duct to provide a way to clean the evaporator coil.
- Use duct-sizing methodology such as Air Conditioning Contractors of America.
- Insure there are enough supply registers to deliver cool air and enough return air registers to carry warm air back to the air conditioner.
- Install duct work within the conditioned space, not in the attic, whenever possible.
- Seal all ducts with duct mastic and heavily insulate ducts. Poorly performing ducts can leak conditioned air and reduce your system's efficiency by as much as 20%. (Leaks can be easily identified with diagnostic equipment).

## Alternatives to Low-E Glass

Anywhere from 20 to 35% of the energy used in buildings is wasted due to inefficient glass.

As a result, two changes have been proposed to the ENERGY STAR® glass performance standards as alternatives to the R-4 insulation value provided by E-glass.



The two alternatives are:

- Triple-pane glass, consisting of three panes of glass and two E-coatings. This increase the insulation value from R-4 to R-6.
- The installation of low-emissivity, solar-reflected film that is suspended inside of an insulating glass unit. Depending on the number of cavities, this can provide insulation performance ranging from R-6 to R-20. (Note: Normal insulated walls carry an R-19 rating).

## Boiler Run-Times

Many boilers in buildings run on clocks. For example, if it is 10 AM and 30° outside, the boiler is on. If it is 3 PM and 54° outside, the boiler is still on— and its probably 80° inside forcing tenants to open windows and waste energy.



The best way to insure that a building's boiler is running at peak operating efficiency is to control burner run-time. This can be accomplished by the use of an EMS (energy management system). EMSs, equipped with thermostats, can regulate boiler run-time based on indoor temperature. They can also cut off a burner if its run-times exceed calculated norms, track stack temperatures, monitor mixing valve temperatures, identify pressure imbalances, and serve as a comparison tool with other buildings.

The use of advanced technology, such as ECMs, should be carefully considered when project owners are exploring ways to make their buildings more energy efficient.

## New CFL Light Bulbs

By now, everyone knows the benefits of using compact florescent lamps (i.e., CFL light bulbs). These bulbs last about 10 times longer than incandescent bulbs and are save up to \$50 in energy costs over their life spans. They also burn much cooler— 104° compared to 970° F— and convert most of the energy into light (only 10% of the energy used by incandescent light bulbs comes out as actual light while 90% is heat).



Some people, however, prefer the shape and soft light associated with incandescent bulbs. Now, three of the world's top light bulb manufacturers— Osram Sylvania, GE Consumer and Industrial, and Philips Lighting, are rolling out CFLs that look and perform more like traditional incandescent bulbs.



**New Energy-Efficient Refrigerators**

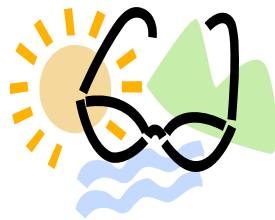
Pre-1993 refrigerators may be costing consumers \$140 per year according to the rocky Mountain Institute. Even refrigerators built between 1993 and 2001 are not as efficient as those on the market today.



The most energy-efficient refrigerators have the freezer on top and the fridge on the bottom. They also do not have automatic ice makers which demand 10% to 20% more energy.

**Reflected Light**

There are two simple ways to reduce the amount of reflected light that enters into living areas.



The first is to install light-colored roofing material that reflects the heat from the sun rather than transferring it into the attic.

Secondly, planting shrubs and trees around the building will reduce the amount of light that is absorbed into the home.

**Beyond Energy Star**



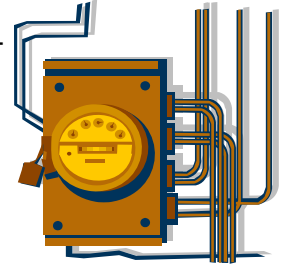
The Energy Star® label on a product means that it is energy-efficient. However, not all appliances are created equal. It would be useful to know the annual energy and water budgets.

To determine this, you can consult the American Council for an Energy-Efficient Economy's Consumer Guide at: [www.aceee.org/consumerguide](http://www.aceee.org/consumerguide).

At this web site, you can find, for example, that a good dishwasher will have an energy factor (the number of cycles per kilowatt hour of electricity) of approximately 0.65-40% better than federal standards.

**Smart Power Meters**

PPL Corporation is a corporation headquartered in Allentown, PA, that controls more than 11,000 megawatts of generating capacity in the United States. It is among a growing number of electricity providers that are testing pricing plans in which rates are set higher during peak demand hours, roughly following the curves of supply and demand in the wholesale energy markets.



This is accomplished by the installation of "smart power meters" that track how much electricity flows into a residence. As a result, utilities are freer to offer alternatives to the average monthly rate that they traditionally charge consumers.