



# Northeast Multifamily Regional Housing Energy Conservation Supplement



Supplement No. 10

Thomas Langston, Acting Hub Director

## Energy Saving Tips



### Climate Action Plan

In June 2013, President Obama issued, The President's Climate Action Plan, a blueprint for steady, responsible national and international action to slow the effects of climate change.



One of the key components is cutting energy waste in homes, businesses, and factories. In a goal to double energy productivity by 2030, the following steps are proposed:

- Establishing efficiency standards for appliances and federal buildings.
- Reducing Barriers to Investment in Energy Efficiency.
- Expanding the President's Better Buildings Challenge (see page 53).

The complete Climate Action Plan can be viewed at:

[http://www.whitehouse.gov/sites/default/files/image/president\\_27\\_sclimateactionplan.pdf](http://www.whitehouse.gov/sites/default/files/image/president_27_sclimateactionplan.pdf)

### 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).

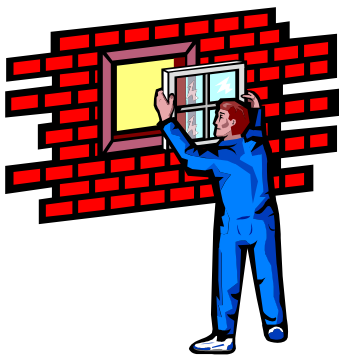
### **New EPA Policy on Sub-metered Apt. Buildings**

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:

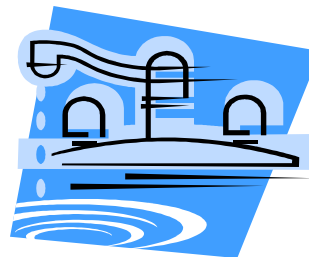


*\*Dual-Flush Toilet*– Uses .8 gallons for a liquid flush and 1.6 gallons for a solid flush. By, comparison, a low-flush toilet uses 1.6 gallons per flush and pre-1992 toilets use between 3.5-7 gallons. A household of four can save 11,000 gallons per year using a 1.6 gallon toilet vs. a 3.5 gallon toilet.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

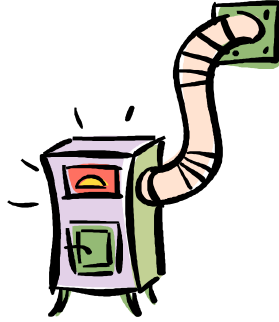


### **Furnace Efficiency**

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**

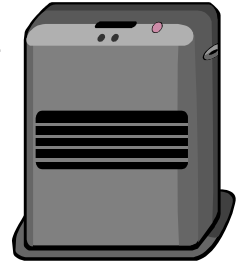
The American Gas Association (A.G.A.) has stated that gas dryers are a customer's best buy because of the energy value of natural gas and the latest high efficiency technology, such as pilotless ignition, automatic shutoffs, sensor controls, de-wrinkling cycles, and automatic cool-down cycles. In fact, 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.

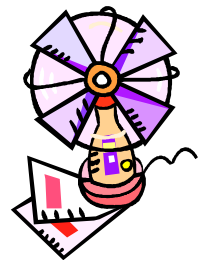


A second way to save on energy costs, is to use adjustable speed drivers (ASD) to allow HVAC motors of 100 hp or more, to reduce their speed (rpms) by 20%, when the system is at or below 70% capacity. This, typically, results in a 50% reduction of energy consumption.

### **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**

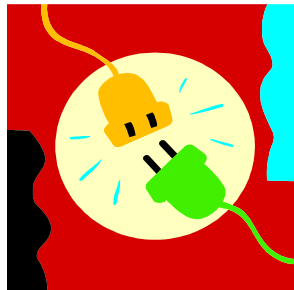
A new trend is starting in the United States—green roofs. Green roofs have been fairly common in Europe, especially Germany, for years. The idea is to cover roofs with 3-6" of soil and create a "meadow" of native plants and grasses. The soil and plants act like a sponge to absorb rainwater, create insulation, 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 fluorescents 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 cogeneration- combined heat and power (CHP) in multi-family 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."

## **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**

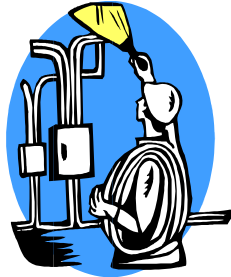
To save on energy costs for central laundries, you should consider installing card-operated appliances so that your operator can set a higher vender price for hot-water washes and a lower price for cold-water washes.

### **Forensic Engineering**

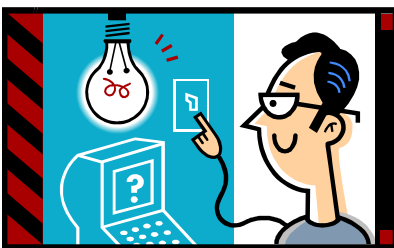
A new and “high-tech” way to diagnose and prevent problems, or analyze system performance in high-rise buildings, is to employ the techniques of forensic engineering.

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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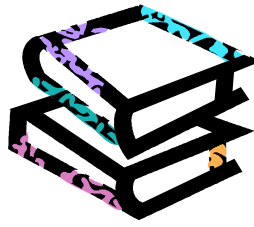
### **Energy Star Appliances**



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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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 af-

fordable 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

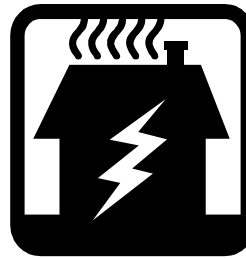
The Energy Policy Act of 2005 provides new tax incentives to rental housing of four stories or more or systems put into place during 2006-2007.



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 Multifamily 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 reduce 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.

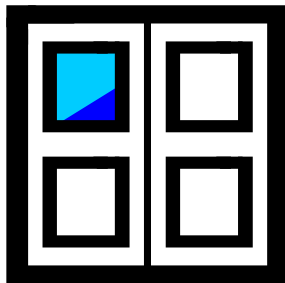


A good resource to compare roof systems is the Cool Roof Rating Council at: [www.coolroofs.org](http://www.coolroofs.org).

### **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.

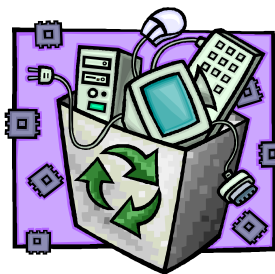


With the aid of academic and private industry researchers, the Department of Energy is seeking to replace these wasteful bulbs, in the future, with solid-state lighting devices that attain 50% efficiency.

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 Re-

covery 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:

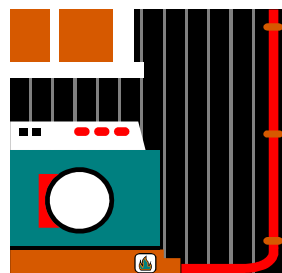
[www.lamprecycle.org](http://www.lamprecycle.org).

### **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**

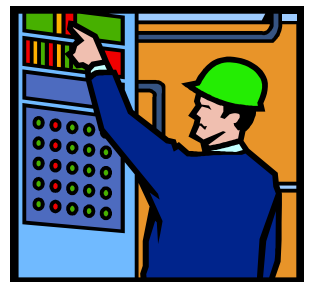


When heating, ventilation and air conditioning (HVAC) systems need replacement, building owners should invest in ones that have high Energy Star SEER (Seasonal Energy Efficiency Rating) ratings. HVAC systems are responsible for 30-50% of a building's energy use. Today's HVAC technology can considerably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



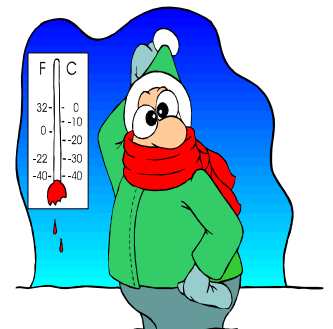
According to the Multihousing Laundry Association, centralized laundries can save up to 300% in energy costs compared to individual hook-ups. In addition, they can save at least 50% in development costs. Because all of the plumbing and drains are in one room, a significant energy savings can be realized 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.

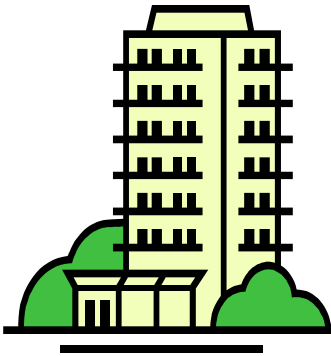
### **New Air Conditioning Standards**

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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.

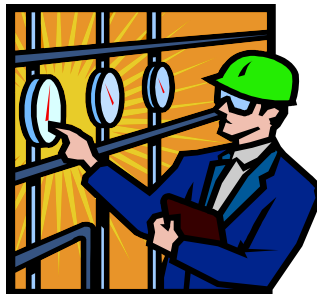
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Compliance is determined by third-party inspectors who review the plans and the actual in-place construction. Energy savings are determined by software that must be certified by the Dept. of Energy.

### **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.

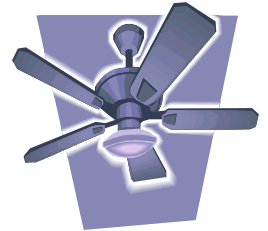


Each year, the cooling system's refrigerant charge and operating safety controls should be thoroughly checked out by an experienced, reputable air conditioning contractor. The contractor should perform the following services:

- 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.

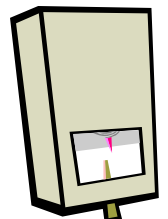
Approved for closet installation, the up to 99% efficient Baxi Luna boiler can cut fuel consumption of traditional heating and domestic hot water systems by between 35 and 53%. The appliance which is fired by natural gas or propane and has multiple heating zones, is compatible with all hydronic air handler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

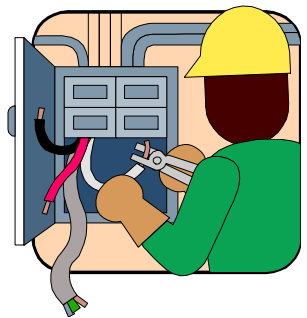


### **Sub-metering**

Utility costs in most apartment 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 specials 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).

### **Thermoplastic Polyolefin Roofs**

Thermoplastic 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





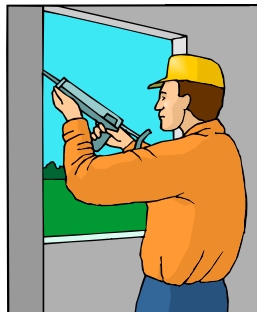
bituminous roof). For a variety of reasons, including economic, social, and performance considerations, the conventional built-up roof system represents less than 30% of the roofs now being installed. Major factors have been the cost of petroleum and the difficulty of finding skilled laborers willing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



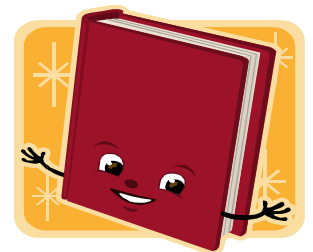
These sensors are basically sophisticated off/off switches and are composed of three main types: passive infrared (detects body temperature), ultrasonic (detects high frequency sound) and dual technology (combines passive infrared and ultrasonic). Although the latter is the more expensive type of sensor,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

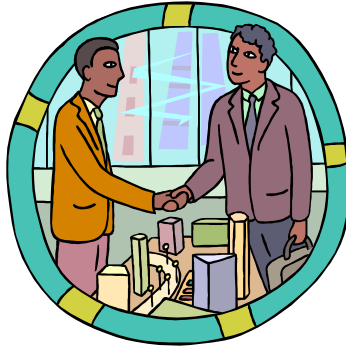
Insulated concrete forms are becoming more widely used in construction to make buildings more energy efficient. In addition to having all of the energy efficiency and strength of conventional insulated walls, these go up faster because fewer pieces are assembled on site. The cost of the material ranges 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).

### **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.

### **More Efficient Lighting**

The U.S. Department of Energy is sponsoring competition among researchers to find the next generation light bulb- an ultra-efficient replacement for the common light bulb. The challenge is to create bulbs that use light-emitting diodes (LEDs) that emit much more light per watt than spiral-shaped fluorescent bulbs and do not contain harmful mercury.



Two designs being sought initially are a 10-watt replacement for 60-watt incandescent bulbs, and a 15-watt replacement for 60-watt halogen flood lights. A future competition will be to develop the 21<sup>st</sup> Century Lamp, which will deliver 8 times the light power of incandescent bulbs with a fraction of the energy.

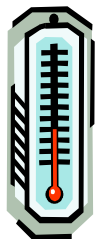
To compete, manufacturers must submit product samples and a commercial plan for mass-producing their bulbs. The samples will be tested by independent laboratories. If the lights pass this first phase, a nonfederal technical review committee, established by the Dept. of Energy, will conduct a more thorough evaluation to determine whether the lights meet required performance and manufacturing standards. The winning developer of each light will be based on the committee's findings.

So far, the Dept. of Energy has discussed the contest with 5 manufacturers, but no submissions have been received yet. It is hoped that the first winner will be announced in 2009. The winning developer of the 60-watt incandescent replacement bulb will receive a cash prize up to \$10 million, while the halogen developer could receive as much as \$5 million. However, the long-term payoff could be much greater. Federal agencies, alone, will be required to replace all of their remaining incandescent bulbs with the winning bulbs in 5 years.

Details of the competition are at: [www.lightingprize.org](http://www.lightingprize.org).

### **Energy Tip**

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



### **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.

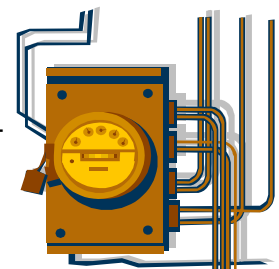
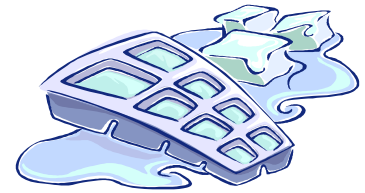
Experts suggest the following things to examine when it comes to your HVAC unit:

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.

## **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.



### **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, lifespan, 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<sub>2</sub>) 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.

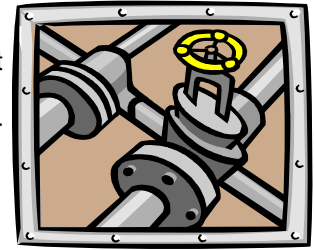
Businesses or individuals interested in determining their "carbon footprint," the total amount of carbon dioxide and other greenhouse gases emitted through the combustion of fossil fuels over the full life cycle of a product or service (i.e., such as a car or air conditioner), can log onto the following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

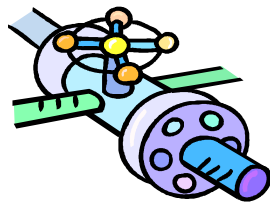
- Reduce energy use by 3% annually and 30% by 2015.
- Reduce water consumption by 2% annually.
- Purchase 50% of renewable energy from new sources.
- Increase alternative fuels use by 10% annually.
- Insure, by 2015, that 15% of all buildings are sustainable (i.e., high environmental standards are incorporated 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**

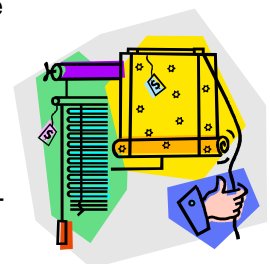
By now, everyone is aware of ways to save energy. However, if you are serious about saving additional energy, make sure the following wasteful practices are avoided:



- 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).

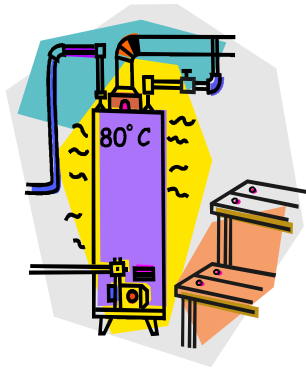
### **Energy Saving Tip**

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.

### **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.

**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.

**Water Heater Energy Saving Tip**

Set your water heater no higher than 120 degrees. You'll save about 15 percent on water-heating energy.

## **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 nighttime 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.



ue provided by E-glass.

Two alternatives are as follows:

- 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).

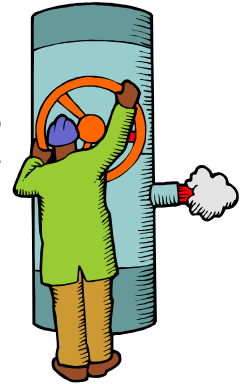
## **Boiler Run-Times**

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**

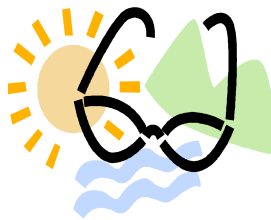
Pre-1993 refrigerators may be costing consumers \$140 per year according to the Rocky Mountain Institute. Even refrigerators built between 1993 and 2001 are not as efficient as those on the market today.



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.

### **Solar Energy Fact**



The world's solar electricity production growth rate has averaged an increase of 40% per year since 2000. The present capacity is 10.6 GW.

### **Energy Efficiency Reports**

The Energy Programs Consortium, a Washington-based nonprofit organization that conducts policy research and demonstration programs, published an excellent 35-page report last year entitled, "Energy Efficiency in Multifamily Housing: A Profile and Analysis."



The conclusion of the report was that energy efficiencies to retro-fit multifamily housing can yield substantial reductions in energy use- from 30% to 75%.

The link is as follows:

[www.energyprograms.org/briefs/index.html](http://www.energyprograms.org/briefs/index.html)

The National Multi Housing Council (NMHC) and the National Apartment Association (NAA) have produced a similar report to help firms identify the most cost-effective ways to meet mandatory and voluntary energy-efficiency goals.

The report, Strategies and Costs to Exceed ASHRAE 90.1-2004 Requirements in a Multifamily Apartment Building, can be downloaded at: [www.nmhc.org/Content/ServeContent.cfm?ContentItemID=4567](http://www.nmhc.org/Content/ServeContent.cfm?ContentItemID=4567).

### **Insulation Tip**

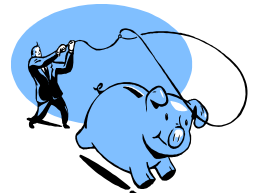
It is common knowledge that improved insulation is a good step toward improving building efficiency- the higher the R-value, the greater the resistance and the insulating value.



But in choosing insulation, you must also consider the material and the density. To determine this, you must look at the U-value. This represents the amount of heat that escapes through a material. The lower the U-value, the slower the rate of heat flow and the better the insulating quality.

### **AFUE Ratings**

Annual Fuel Utilization Efficiency (AFUE) ratings are a simple way to determine the efficiency of furnaces before you buy them. Simply stated, for every dollar you spend on fuel the rating tells you how much you receive in heat. A 96% furnace (the highest rating), for example, gives you \$.96 worth of heat for every \$1.00 of fuel. Compare this to an old furnace where only \$.60 goes into the living space and \$.40 goes up the chim-



**Energy-Efficient Lawnmowers**

Each year, 500 million gallons of gasoline are used to keep 30 million acres of lawn from coast to coast neat and trim. Besides being expensive to operate (with gasoline over \$4 per gallon), they are harmful to the environment. One hour behind a gasoline powered lawnmower produces the same amount of pollution as a car does on a 350 mile trip.



Now there is a practical alternative. Today, high performance cordless electric mowers with rechargeable batteries are available. These mowers start easily by flipping a switch or lever. They are also very quiet and do not pollute the environment. Although they are more expensive than their gasoline counterparts, they are cheaper in the long run because they do not require gasoline, oil or tune-ups. The electricity to operate these mowers costs just a few dollars per year.

Different battery technologies are used by different manufacturers. It is wise to look at the owner's manual or inquire about the battery needs before purchasing one of these mowers. Generally, these mowers run from 45 to 90 minutes on a charge- long enough to cut ½ to one acre. Some require that the battery be constantly charged when not in use, except in the winter in the case of some models. Others require that the lawnmower or the battery be stored at a frost-free location in the winter.

Overall, the advantages of electric lawnmowers clearly outweigh the disadvantages. They should be considered whenever replacement mowers are needed.

**Energy Tip**

Two ways for tenants to save on laundry costs are to wash only full loads (save 300-400 gallons of water per year) and use cold water. Switching from warm to cold water can cut energy use by 50%, according to the U.S. Dept. of Energy.

**Air Conditioning Fast Fact**

The Association of Home Appliance Manufacturers has reported that the average Energy Efficiency Ratio (EER) of room air conditioners has increased 47% from 1972-1991. Because of this, operating costs for electricity can be cut in half if a vintage 1970s air conditioner is replaced with one with an EER of 10. (Note- Energy Guide Labels can be checked to purchase units with EER's of 10+).

**More Energy-Saving Appliance Tips*****Ranges/Ovens***

- Self-cleaning ovens have more insulation and use less energy. A clean oven is more efficient.
- If you are cooking a small quantity, consider using the microwave, toaster oven or slow cooker.
- Preheat only for baking.
- When possible, use the broiler. It requires less energy.
- Keep burners and reflectors clean.
- Use the oven window to check food instead of opening the door.
- Use covered pans to boil water; match pan and burner sizes.
- On a natural gas appliance, look for blue flames; yellow means gas is not burning efficiently.

***Dishwasher***

- Wash only full loads. Each wash uses the same amount of energy whether it's full or not.
- Use the short cycle or economy mode when possible.
- Scrape, don't rinse large pieces of food from dishes. Soaking or pre-washing is usually only necessary for burned or dried-on foods.
- If there's an energy-saving switch that turns off the heating element during the dry cycle, use it, or open the dishwasher and let the dishes air dry.

**Payback Period for Energy Star Products**

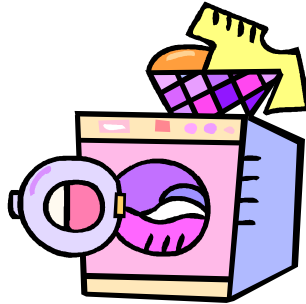
It is now common knowledge that Energy Star products and appliances save money in the long run. Using life-cycle costing, in which both the initial costs of the equipment and the operating costs are assessed, it can be demonstrated that higher up-front costs may result in financial benefits over time.

The Energy Star Cost Calculator estimates the following payback period (years) for Energy Star-labeled products and appliances:

- Dishwasher— 0 years
- Refrigerator— 4.3 years
- Washer— 4.4 years
- Programmable thermostat— .1 year
- Furnace— 1.1 year
- Central AC— 1.6 years
- Boiler— 3 years
- Heat pump— 3.5 years
- Compact fluorescent bulbs— .3 years
- Fixtures— 1.3 years

### **Energy-Saving Dryer Tips**

- Dry full loads.
- Clean dryer filter after each use.
- Keep exhaust area lint free.
- Don't over-dry clothing.
- Do a few loads in a row to take advantage of the dryer's reserved energy.
- If you have an outdoor clothesline, use it.
- If you purchase a new dryer, make sure it includes a moisture sensor. Dryer will turn off automatically when clothes are dry.

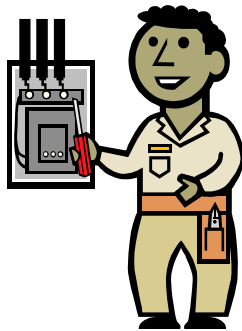


### **Green Trends in 2010**

This year, there will be a continued emphasis on “green” technology, in both new construction and existing buildings.

Among the easiest and less costly strategies to implement are:

- Sub-metering.
- HVAC control systems.
- Low-flow water fixtures.
- Recycled water sources.
- High-performance window glazing.
- Pervious sidewalks, driveways, and parking lots.



### **How to Improve Outdoor Lighting**

There are several operational practices that projects can adopt to improve their outdoor lighting:

Improved performance can be achieved by:

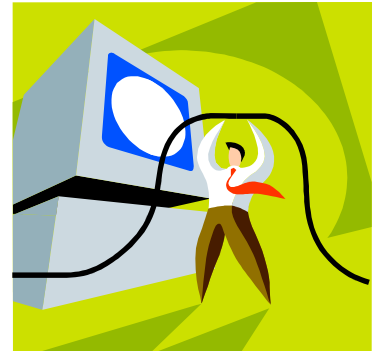
- Adding controls to shut off lights to reduce power consumption.
- Install motion detectors instead of leaving the lights on.
- Turn off interior lights when not in use.
- Monitor and maintain lighting installations to insure that night time light is on all day.



### **Power-Down Your Computers**

Do you know that turning off computers when not in use can save between \$25 and \$75 per computer per year, according to the Energy Department?

This can be achieved in a variety of ways: black screen-saver screens, hibernation modes, standby features, or software that enables administrators to turn off an organization's computers each day.



Most computer users do this for their laptops as a way to conserve battery power. But they generally do not do this for their desktop computers. In some cases, that's because they may be told to leave them on at night so their IT specialists can perform daily maintenance, install security patches or upgrades. But even in these cases, there is little reason why desktop computer users cannot take advantage of the same power-down features that most people already use for their laptops. Power management software can be installed that will enable IT specialists to automatically turn on and off all of a company's computers at night. Such a product will allow computers to be on only when they are actually being used or maintained.

A good example of what can be achieved is the case of the U.S. Department of Agriculture, where its chief information officers have been ordered to implement basic power savings features on the department's 118,000 computers. The projected annual savings for three energy conservation actions are as follows:

- Computer monitors shut off after 15 minutes of inactivity – 62.0 million kilowatt hrs., 47,601 tons of carbon and \$5.6 million.
- Computers hibernate after 30 minutes of inactivity: 58.0 million kilowatt hrs., 44,427 tons of carbon and \$5.2 million.
- Black backgrounds and screensavers are used: .1 million kilowatt hrs., 87 tons of carbon and \$.01 million.

The savings projected is greatly magnified if you apply these power management tools to the entire government's 5.56 million desktop and laptop computers— \$280 million!

While you, of course, will not achieve savings of this magnitude, the prudent application of these practices will help to lessen your project's monthly electricity bill.

### Refrigerator Energy Saving Tips

- Do not put a fridge near a stove, dishwasher or heat vent.
- Allow at least 1 inch of space on each side for good circulation. (Poor circulation can increase energy use by up to 10 percent.)
- If you maintain a second fridge, consider unplugging it when it's not needed. This won't hurt the appliance and can save you up to \$200 a year.
- Don't open the fridge more often than necessary. Cool air escapes quickly.
- Check the seals on your fridge door by closing the door over a dollar bill or piece of paper. If the paper slides out easily, then the seal or fridge needs to be replaced.
- The best temperature is about 37 degrees to 40 degrees Fahrenheit. The freezer should be set at about zero degrees Fahrenheit. If you don't have a thermostat in your fridge, place an appliance thermometer in a glass of water in the center of your fridge and read it after 24 hours.
- Vacuum fridge coils every six months. (Dirt and pet hair build up, making your fridge work harder to keep food cool.)
- Cover all liquids and wrap all foods. Uncovered containers release moisture that makes the compressor work harder.



### Update on Energy Star Pledge

Nationally, from 2005 to October 2008, 1,943,277 individuals have pledged to save energy and help fight global warming. Pledged actions have resulted in a collective reduction of 3,560,985,352 lbs. of greenhouse gas emissions, 2,281,662,125 kWh of energy, and have saved \$256,797,782 in energy costs.



A breakdown of the Hub's four states is as follows:

NJ- 34,856 pledges; 103,570,936 lbs. of greenhouse gas emissions, 65,985,777 kWh of energy, and have saved \$7,501,520 in energy costs.

PA- 38,224 pledges; 85,872,928 lbs. of greenhouse gas emissions; 53,846,394 kWh of energy; and have saved \$6,281,349 in energy costs.

DE- 77,152 pledges; 73,529,507 lbs. of greenhouse gas emissions; 47,767,045 kWh of energy; and have saved \$5,239,117 in energy costs.

WV- 6,361 pledges; 12,529,014 lbs. of greenhouse gas emissions; 8,029,986 kWh of energy, and have saved \$903,767 in energy costs.

To take the Energy Pledge, or to learn more about the program, see: <http://www.energystar.gov/index.cfm?fuseaction=globalwarming.showPledgeHome>

### Clean HVAC Coils

One of the easiest, most cost-effective energy-saving things you can do for your building's energy efficiency is to have your HVAC system's condenser and evaporator coils inspected yearly, and cleaned as necessary.

According to the Dept. of Energy, a dirty condenser coil can increase compressor energy consumption by 30%. Similarly, a dirty evaporator coil decreases air flow, resulting in reduced heat transfer and a degradation of the dehumidification process. This can cause overall air quality to decline and systems to fail, as well as decreasing the life expectancy of motors due to increased operating temperatures.

It should be mentioned that it is not just old systems that need cleaning. New units with high SEER ratings require more efficient heat transfer across larger coils to function at their highest capacity. Also, their variable-speed fan motors lose much of their effectiveness when forced to run harder due to fouled condenser vanes.

### New Jersey State Energy Assistance



The New Jersey state energy assistance program started on November 1 and runs until April 30, 2009.

Available programs include the Low Income Energy assistance Program, to aid renters or owners with cooling, heating or energy costs; the Universal Service Fund Program, under which energy and utility

companies may pay part of a qualifying low-income person's energy bill for 12 months; and county-administered weatherization, where residential improvements are made by subcontractors after energy audits.

The programs are funded by federal block grant money managed by the state. For additional details, see: [www.energyassistance.nj.gov](http://www.energyassistance.nj.gov).

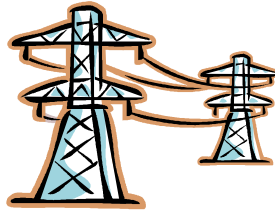
County telephone contacts are as follows:

Burlington Co. (Ann Francemore)– 609-835-4329  
Camden Co. (Michele Brown-Williams)- 856-910-1180  
Gloucester Co. (Constance Campbell)- 856-423-0040



### **Integrated Cooling**

Energy is the most significant driving force of our economy. All buildings need electric power for lighting and operating equipment and appliances. One of the major consumers of energy in buildings is the equipment for space conditioning. Most commercial and institutional buildings for businesses, education, and healthcare require space conditioning for cooling, heating, and/or humidity control.



Two-thirds of all the fuel used to make electricity in the U.S. generally is wasted by venting unused thermal energy, from power generation equipment, into the air or discharging into water streams. While there have been impressive energy efficiency gains in other sectors of the economy since the oil price shocks of the 1970's, the average efficiency of power generation within the U.S. has remained around 33% since 1960. The average overall efficiency of generating electricity and heat by conventional systems is around 51%.

Integrated cooling, heating and power systems for cooling, heating and power (CHP)- which also are known as cogeneration, trigeneration, energy recycling, cooling, heating and power, or total energy systems- provide a mixture energy services to a single facility or to a group of buildings. Electricity to such buildings is provided by on-site or near-site power generators using one or more of the many options: internal combustion (IC) engines, combustion turbines, microturbines, steam turbines or fuel cells. In CHP systems, heat that otherwise would be wasted is "recycled" and used for cooling, heating, or dehumidifying.

Integrated cooling can increase total system efficiency to as high as 85%. This increase is accomplished by using thermal energy from power generation equipment that otherwise would be wasted for cooling, heating and humidity control systems. These systems are located at or near the building using power and space conditioning, and can save about 40% of the input energy required by conventional systems. In other words, conventional systems require 65% more energy than integrated systems.

Your project may be a candidate for CHP, if you can answer "yes" to 3 or more of the following questions:

- Do you pay more than \$.06/ kWh on average for electricity (including generation, transmission and distribution)?
- Are you concerned about the impact of current or future energy costs on your business?
- Is your facility located in a deregulated electricity mar-

ket

- Are you concerned about power reliability? Is there a substantial financial impact to your business if the power goes out for 1 hour? For 5 minutes?
- Does your facility operate for more than 5000 hours/year?
- Do you have thermal loads throughout the year (including steam, hot water, chilled water, hot air, etc.)?
- Does your facility have an existing central plant?
- Do you expect to replace, upgrade or retrofit central plant equipment within the next 3-5 years?
- Do you anticipate a facility expansion or new construction project within the next 3-5 years?
- Have you already implemented energy efficiency measures and still have high energy costs?
- Are you interested in reducing your facility's impact on the environment?

The Mid Atlantic Combined Heat and Power Application Center, based in the Center for Environmental Engineering at the University of Maryland, provides information and technical assistance to organizations located in the Mid-Atlantic Region at no cost. Among the services provided are screening tools, guidebooks, contacts for local resources, site surveys, proposal reviews, assistance with permit applications, formal presentations, etc.

To find out more about this cutting-edge topic, see:

Web site: [www.chpcenterma.org](http://www.chpcenterma.org)

Telephone: (301)405-4681.

Address: Mid-Atlantic CHP Application Center,  
4164 Glenn Martin Hall, College Park, MD 20742

### **Green" Water-Saving Option**

A new water saving option is the dual-flush toilet. Conversion kits for adjustable handle flushes can be purchased from True Value or Ace Hardware stores. These special handles will save the average household about 30 gallons a day by flushing less water for liquids than solids.



### **Energy-Saving Roof Sheathing**



Radiant barrier sheathing- thin sheets of aluminum laminated to wood panels- can save up to 17% on monthly energy bills. The sheathing, applied during new construction or when an existing roof is replaced, is installed above the rafters, beneath shingles, to block the sun's radiant heat from entering the attic in the summer. It also works as well in the winter by minimizing heat loss.

**CFL Facts**

In an effort to reduce energy costs, many people are replacing incandescent light bulbs with compact fluorescent light (CFL) bulbs. However, there are some facts about these bulbs that they should know.

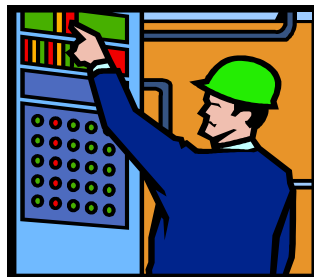


The following tips were prepared by Rensselaer Lighting Research Center, the federal government's energy star program and experts from Consumer Reports magazine;

- Be aware that CFLs can take 1-3 minutes to reach full brightness.
- Turning the bulbs on and off frequently will shorten their life. Ideally, they should be used where they will be on at least 15 minutes at a time or several hours per day.
- Avoid installing CFLs in hot places with little airflow, like recessed lighting. They are ideal for table lamps.
- Not all CFLs work with dimmers or 3-way sockets.
- The "warmest" looking bulbs have a color temperature less than 3,000 kelvins, with the harshest bulbs usually above 5,000.
- CFLs contain mercury and should not be disposed of in the trash. Many chain stores, like Home depot, offer recycling bins for the bulbs.
- If a CFL bulb breaks take precautions by following the EPA clean-up guidelines at: [www.epa.gov/mercury/consumerinfo.htm#cfl](http://www.epa.gov/mercury/consumerinfo.htm#cfl)

**HVAC Audits**

Routine audits of a building's heating, ventilation, and air condition systems (HVAC) should be done annually and basic checks should be performed quarterly. Such audits and checks can result in energy savings by;



- Adding variable speed drives to chillers.
- Right-sizing fans.
- Adjusting/upgrading controls (i.e., changing cycles).
- Optimizing ventilation.
- Replacing worn motors, leaking valves, inefficient compressors, ineffective heat exchangers, and inefficiencies in the fuel/energy process.

Such audits, in smaller buildings, can be performed by project maintenance staff. In summary, owners should

audit what they can, as part of a consistent, practical, and cost-effective program.

**White vs. Black Roofs**

In the December 2009 issue of Buildings, the benefits of white vs. black roofing membranes roofs was discussed. The choice, however, is a complicated one that requires much research. Their conclusions were as follows:



- Select the most durable roofing membrane that you can afford.
- Use membranes with higher solar reflectance and emittance in hot, sunny climates.
- Use membranes with high solar reflectance and emittance on air-conditioned buildings in all climates as long as durability is not compromised and there is no significant energy consumption penalty.
- For most roofing assemblies, use a white ENERGY STAR/CRRC membrane with a high aged solar reflectance (above 0.70) and an initial emissivity (0.80) from the durable membrane based on climate.
- Consider built-up, ENERGY STAR/CRRC alternatives to thermoplastic membranes in extreme southern climates.
- Use black built-up and EPDM membranes where heat island issues are limited on buildings without air conditioning and where there is a significant energy penalty for a white membrane, or where ballast or other green roofing solutions provide similar performance to a white roof.

**New Trends in Insulation**

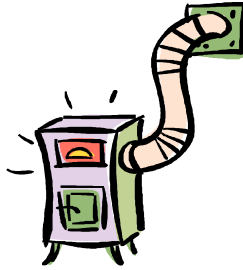
Insulation is a low-cost way to optimize a building's energy efficiency. Some of the new trends in insulation are as follows:



- Nano (composite) insulation, acoustic tiles, and moisture-resistant drywall made from chicken feathers or hemp.
- Insulating concrete forms (ICFs).
- Insulated metal panels.
- Concrete and foam structural insulated panel wall systems.
- Structural foam, rigid board, and fiberglass insulated panels.
- 2 x 6 advanced framing.
- Super-insulated system approaches to envelope design.
- High-performance, high-density fiberglass batts.

### **What is AFUE?**

AFUE stands for Annual Fuel Utilization Efficiency. It is an efficiency rating measurement that must be displayed on all new furnaces and boilers, per the Federal Trade Commission. It allows consumers to compare heating efficiencies of various models and make educated buying choices.



Specifically, AFUE is the ratio of heat output of a furnace or boiler compared to the total energy consumed by that appliance. An AFUE rating of 90% means that 90% of the energy in the fuel becomes heat for the building and the other 10% escapes up the chimney and elsewhere (e.g., duct system or piping).

### **Recycling CFLs**



Compact fluorescent lamps (CFLs), and with other energy-efficient lighting such as linear fluorescent and high intensity discharge (HID) lamps contain a very small amount of mercury, an element essential to achieving energy savings. While these lamps help consumers and businesses cut their lighting energy usage and reduce energy costs, it is important that any product containing mercury be properly managed when it becomes waste to protect public health and the environment.

Easy and convenient options exist for both businesses and consumers to recycle waste mercury-containing lamps. It is estimated that businesses already recycle over 30% of their waste lamps annually and consumers are embracing lamp recycling as they switch to more efficient lighting technologies.

To learn about the safe way to recycle energy efficient lighting, see: [www.lamprecycle.org](http://www.lamprecycle.org)

### **Outdoor Lighting**

A great energy saver is the replacement of HID (metal halide) parking lot lighting with LED (light-emitting diode) units. While, two LED fixtures are required to replace one HID fixture, such conversions can reduce parking lot wattage from 1,000 watts per fixture to 190 watts- an 81% decrease in wattage.



This energy saving measure is not restricted just to parking lots. Such retrofitting can also be done to exterior entrance lighting and sidewalk lighting.

### **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

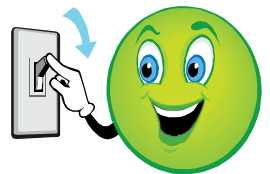
Please send your narratives by e-mail (Word attachment) or mail to:

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

### **Turn Off the Lights?**

In an "Mythbusters" episode on the Discovery cable television channel, the "myth" of turning off lights to save energy was tested.



After a series of scientific tests, using various types of light bulbs (e.g., incandescent, CFL, LED, halogen, and CFL), it was definitively proven that it is vastly energy efficient to turn lights off, as opposed to leaving them continuously burning.

As an example, one of the tests calculated the start-up energy that is used to activate a bulb. After comparing this figure with the energy used in leaving the bulb on, it was determined that a person would have to be out of a room less than .01 seconds for a CFL bulb, .36 seconds for an incandescent bulb, and 23 seconds for a fluorescent bulb to make turning off the lights the more cost efficient choice.

So, turn off those lights!

**WaterSense**

WaterSense is an EPA-sponsored partnership program to protect the future of our nation's water supply by promoting water-efficient products and services.



Like the Energy Star label, the WaterSense label makes it easy for consumers to find and select products that save water while performing as well or better than conventional products. The label can be found on the following products: toilets, bathroom sink faucets and accessories, urinals, showerheads, pre-rinse spray valves, and weather-based irrigation controllers.

Generally, these products will perform as well or better than their less efficient counterparts, be about 20% more water-efficient than average products in that category, realize water savings on a national level, provide measurable water saving results, achieve water efficiency through several technology options, be effectively differentiated by the WaterSense label, and be independently identified.

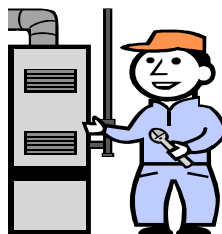
For companies that use the label, they must sign a WaterSense partnership agreement. Among other things, the partnership agreement defines the roles and responsibilities of EPA and the partnering organization, as well as the proper use of the label, on packaging, and in marketing and other promotional materials. A list of WaterSense partners who provide design, installation, maintenance, and auditing services can be found at the following websites:

[www.epa.gov/watersense/meet\\_our\\_partners.html](http://www.epa.gov/watersense/meet_our_partners.html)

[www.epa.gov/watersense/nhspecs/water\\_budget\\_tool.htm](http://www.epa.gov/watersense/nhspecs/water_budget_tool.htm)

**HVAC Cleaning**

HVAC (Heating, Ventilation, and Air Conditioning) cleaning can improve a building's indoor air quality and increase efficiency up to 30%. This work should be done every 2-5 years, depending on the conditions that decrease the system's airflow (e.g., pollen, dust, renovation work, and nearby construction).



Here are a few cleaning guidelines:

- The technician should follow NADCA (National Air Duct cleaners Association) standards.
- Debris should be loosened using brushes, air whips, or compressed air.

- Loose debris should be collected using a negative-pressure vacuum cleaner to avoid spreading the contaminants.
- Service openings that were used during the cleaning process must be professionally sealed.
- After the ductwork has been cleaned, the technician should inspect the blower, blower motor, air conditioning coils, and external surfaces to insure that they are clean and functioning properly.

**Strengthened Energy Star Certification**

As a result of a recent investigative report by the General Accounting Office (GAO) concerning fictitious Energy Star products, the Environmental Protection Agency (EPA) has announced plans to strengthen the program.



From now on, each application will be reviewed individually by an EPA staff member (as opposed to the automated approval process previously in place). By the end of 2010, companies that want Energy Star certification for their products will be required to submit lab results from an independent testing agency rather than their own evaluations.

**PECO Smart Ideas Incentives**

Customers of PECO can now take advantage of financial incentives for retrofits that incorporate energy efficient measures for all major uses. Incentives are being offered in the following four areas:

- Smart Equipment Incentives (HVAC, lighting, drives/motors, and refrigeration & food services)
- Smart Gas Efficiency Upgrade
- Smart A/C Saver (programmable communicating thermostat)
- Smart Natural Gas Conversion

The first cycle for the Smart Equipment Incentives Program runs from July 1, 2009 through May 31, 2011. Each subsequent program year cycle ends on May 31. Incentives are offered until program funds are exhausted or until May 15 of each program year, whichever comes first. All PECO Smart Equipment Incentive Projects must be completed and final applications received no later than May 15 to be eligible for incentives in that program year.

To learn more about the program and how to apply for next year's incentives, see:

[www.peco.com/SmartIdeas](http://www.peco.com/SmartIdeas)



**Reusable Water Facts**

A roof in a region receiving 30 inches of annual rainfall generates 37,500 gallons of reusable water.

One inch of rainfall on a 2,000 sq. ft. roof equals 1,250 gallons of water.

**End of Incandescent Bulbs?**

The Energy Independence and Security Act of 2007 created higher efficiency standards targeting today's 40–100W incandescent and halogen general-service lamps. Starting Jan. 1, 2012, 100W lamps will have to become 30 percent more efficient or be prohibited from manufacture and import; Jan. 1, 2013, targets 75W lamps; and Jan. 1, 2014, targets 40W and 60W lamps.



The result— the virtual elimination of targeted general-service incandescent and halogen lamps in these sizes, putting billions of sockets up for grabs. In fact, one home retailer, IKEA, began phasing out its inventory of incandescent light bulbs in U.S. stores on August 1, 2010. This recent IKEA environmental initiative has a target date of incandescent bulb elimination by January 1, 2011. This IKEA phase-out will come in advance of the federal legislation that will begin to phase out incandescent light bulbs in 2012. IKEA is taking the lead before this new legislation takes effect.

So the bulb is being effectively banned, and we all soon will be exclusively using compact fluorescent lamps (CFLs), right? Everybody knows this. It has been all over the news. Except that it's not true. Consumers will continue to have choice. What are the options?

The act certainly appears to favor CFLs, which produce comparable light output in a choice of color tones and for a fraction of the energy. CFLs already are enjoying a fast adoption rate. Last year, nearly 300 million were sold, taking 20 percent of the bulb market, up from 5% in 2005. If you're looking to maximize energy savings, choose CFLs.

Not everybody is a fan of these lamps, however. They don't fit every fixture and aren't suitable for many recessed fixtures. They require special models if you want them to dim, and dimming control manufacturers complain about dimming lamp performance. They don't start instantly, and they contain mercury—a negligible amount according to the EPA, but enough to warrant recycling and special precautions in the event of breakage. Incandescent diehards will be looking for the act's exemptions, but if these loopholes get too popular, the affected

lamp types likely will become targeted by regulation.

Another alternative that actually saves energy is using general-service lamps that already comply, such as Philips' Halogená Energy Saver lamps, available to the U.S. consumer market through Home Depot. These screw-in halogen lamps are produced in 40W, 50W and 70W models to replace 60W, 75W and 100W incandescent lamps, respectively, for about 30 percent energy savings and nearly 10% less light output. They also dim easily. And speaking of dimming, control the lamps with a dimmer, and you'll save 20 percent in energy. According to research conducted for the California Energy Commission, dimming effectively reduces input watts by an average 20%.

General Electric Co., which has a significant stake in the incandescent business, is working on a high-efficiency incandescent (HEI) lamp, aiming for an approximate doubling of average incandescent efficacy to 30 lumens/watt by late 2009 or early 2010. The HEI is expected to reach 60 lumens per watt in the second generation.

GE isn't alone in its plans to raise the efficiency of the incandescent light bulb. Advanced Lighting Technologies' (ADLT) recent acquisition of the lighting technology division of Schott AG, Auer Lighting, has enabled introduction of a new Nano Film Capsule technology for its own energy-efficient incandescent "hybrid" bulb that can at least double the efficacy of today's incandescents, according to the company.

What about light-emitting diodes? A-lamp replacement LED lamps promised high energy savings but bombed in Department of Energy CALiPER product testing in 2007. Just because a product is LED doesn't necessarily mean it's energy-efficient. But do not count the LEDs out. The act created a \$10 million prize for an LED general-service lamp that can replace today's 60W incandescent bulbs while meeting certain performance criteria. The technology is moving fast. The act says efficiency must increase to at least 45 lumens per watt by 2020 at the latest, again putting billions of sockets up for grabs. But with continued advances in lighting technology—including potential future developments in OLED technology, raising possibilities of "lighting wallpaper"—contractors and their customers may continue to enjoy choice in home lighting far into the future.

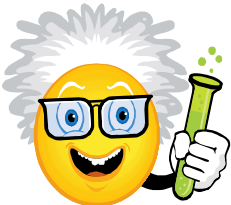
**Energy Conservation Tips on the Web**

The following websites provide valuable information to assist building owners to conserve on their energy costs:

www.energystar.gov  
 www.greenlivingguy.com  
 www.retrofitamerica.com  
 www.energystar.gov/index.cfm?  
 fuseactionHOME-ENERGY-  
 YARDSTICK.showGetStarted  
 www.energysavers.gov  
 http://resnet.us/  
 www.recurve.com

**Sewer Charge Savings**

For high rise buildings that have cooling towers, there is a simple way to reduce the sewer component of a project's bill— by installing a separate meter on the water supply that serves the cooling tower. This savings results because most municipalities charge for sewer service by tying it to the gallons of water used. By metering the cooling tower water that is evaporated, the sewer component of that bill can normally be eliminated.

**Intelligent Energy Meters**

"Smart" energy meters are now available that identify wasteful energy practices in buildings and assist in developing energy-efficient action plans.

Depending on the model, these electric sub-meters can gather data on voltage, wattage, kWh used, power factor, and greenhouse gas emissions. The equipment can also be used to measure benchmarks, monitor usage trends, and assess the performance of energy-efficient improvements. Some can even assist in providing a cost analysis by interfacing with central computers and utility-issued meters.

**Water-Saving Faucet Aerators**

You do not have to replace old hand sink faucets to save on your water bill. For less than \$10 apiece, existing aerators can be replaced with 1.0 GPM compensating spray aerators. This will, typically, save a building 15-30% of water usage.

**Cool Roofs**

It is a commonly known fact that white roofs are a quick and cost-effective way to save on summer air conditioning bills, as well as to reduce carbon emissions, but did you know the specifics?

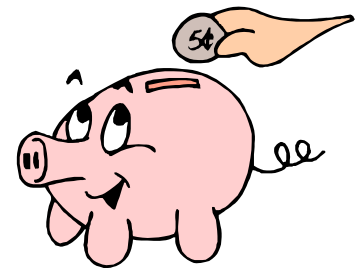


A coating of white reflective paint can reduce the temperature of a roof by up to 60 degrees and result in temperatures that are 15 degrees cooler inside. Also, according to California official, Arthur Rosenfeld, an average 1,000 sq. ft. roof painted white can save 10 tons of carbon dioxide, the equivalent of emissions from one car for about 2 ½ years.

It should be noted that while there are no federal tax credits for roof coatings, there is a tax credit for using cool materials when replacing a roof.

**Lower Your Utility Bills**

Cooling and heating a dwelling uses more energy than any other system. Unfortunately, a large portion of that energy is wasted. By using a few inexpensive energy-efficient measures, you can reduce your energy bills by 10-50% and, at the same time, help reduce air pollution.

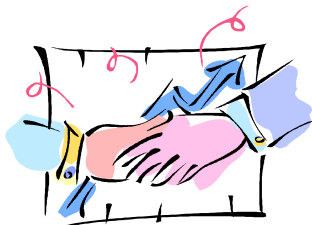


The following energy-conservation steps can save an average dwelling \$1,160 per year:

- Install double-pane or storm windows: \$300
- Install programmable thermostat: \$180
- Attic, floor, and wall insulation: \$160
- Close vents in unused rooms: \$100
- Use EnergyStar® appliances: \$80
- Lower thermostat settings: \$85
- Clean lint dryer filter after use: \$66
- Insulate hot water heater: \$40
- Caulk, seal & weather strip: \$40
- Use compact florescent bulbs: \$35
- Take showers instead of baths: \$28
- Use insulated curtains: \$24
- Lower hot water heater to 115° F: \$22

**University Square Plaza Cogeneration**

On December 14, 2010, a dedication was held to launch the operation of a cogeneration (combined heat and power) plant at University Square Plaza, a 442-unit high-rise project, located in Philadelphia, PA.



Made possible through a public-private partnership and funded by a \$1 million competitive, matching grant from the State of Pennsylvania's Green Energy Works! Program, the combined heat and power (CHP) system will provide electricity, hot water and heat to the project. It is the first CHP grant initiative in the state to be completed under the program.

CHP technology simultaneously produces useable heat and electricity from one fuel source- in this case natural gas. By using CHP technology, AIMCO is increasing the building's system efficiencies and reducing its carbon footprint by 2,500 tons. The system is 85% electrical and thermal efficient- a 52% efficiency rate increase over traditional power stations.

HUD is delighted that AIMCO has taken the lead in our area to install this innovative technology in University Square Plaza- a project with a long history of providing quality affordable housing to the elderly residents of Philadelphia since 1978.

**9 Steps Toward Green**

To assist property managers and other affordable housing professionals in retrofitting affordable housing with green features, the Local Initiatives Support Corporation (LISC) released an excellent guide, 9 Steps Towards Green: Introducing Sustainability to Affordable Housing on a Limited Budget. The guide provides information on budget-saving affordable housing retrofits that also incorporate techniques for reducing energy use, lowering utility bills, and improving indoor air quality.



For each recommendation, the LISC guide includes information on the cost of implementation and also when the owner/manager can expect to see a return on her investment.

For additional details and a link to the guide, please visit:

[http://www.lisc.org/docs/ISC\\_9\\_Steps\\_Toward\\_Green.pdf](http://www.lisc.org/docs/ISC_9_Steps_Toward_Green.pdf)

**Hidden Danger- CFLs**

It is now a well known fact that compact fluorescent bulbs (CFLs) are more efficient than wasteful incandescent bulbs that convert only 10% of the energy they consume into light.



This efficiency, however, comes at a price. Each bulb contains up to 5 milligrams of mercury- a potent neurotoxin. In addition, only about 2% of residential consumers and 33% of businesses recycle them. As a result of discarded florescent lights, including CFLs, U.S. landfills release into the atmosphere and storm water runoff, upwards of 4 tons of mercury annually, according to a study in the Journal of the Air and Waste Management Association.

Residents, however, can mitigate this problem by turning in used bulbs at stores such as Home Depot, Lowe's, some Walmarts, and at county recycling events. A complete listing for your area can be found at:

[www.earth911.com](http://www.earth911.com)

In the future, it is expected that CFLs will be replaced by LEDs (light emitting diodes) which contain no mercury, are 85% more efficient than incandescent bulbs, and burn for 25 years. The main drawback is cost at \$30 per bulb. Prices for LEDs, however, are expected to plunge in coming years as demand and production increase.

**Energy Efficiency Efforts**

According to a study by the Economist Intelligence Unit, companies have taken the following approaches to energy efficiency:



- 68%- Improved efficiency of lighting
- 53%- Complied with government regulations
- 47%- improved efficiency of air conditioning
- 45%- Improved efficiency of heating
- 40%- Enhanced efficiency of building (insulation)
- 35%- Improved efficiency of IT department
- 33%- improved energy-efficient of equipment
- 26%- conducted energy audit
- 24%- Created new energy products or services
- 22%- Created flexible work hours for employees
- 5%- Miscellaneous

**Energy-Efficient Light Bulb Law**

The federal law requiring more energy-efficient light bulbs will be phased in starting in January 2012. The new incandescent standards will save the nation an estimated \$12.5 billion a year- \$85 a year for the average American family- and is expected to help reduce pollution by 2020, when the law is fully implemented, according to research by the nonprofit National Resources Defense Council. In New Jersey, the expected household savings will be higher at \$125 because of higher energy use than other states. Statewide, the council projects savings of \$447 million. (Note- Lighting traditionally accounts for 9% of a household utility bill).



Penalties against manufacturers for failing to meet energy standards range from \$200 to a maximum \$500,000 for product violations. Manufacturers can also be cited for failure to file certain required product reports with the federal government.

The 2007 Energy Bill mandates that traditional incandescent light bulbs that were invented by Thomas Edison 125 years ago must be 25 to 30% more energy-efficient by 2014, and 65 to 70% more efficient by 2020, eventually making them as efficient as today's newer compact fluorescents (CFLs). Old-fashioned bulbs lose 90% of their energy through heat, according to energy experts. Not all traditional incandescents, however, will be eliminated. Unique bulbs for candelabra, appliances, globes, show-cases, three-way lamps, bug lights and plant lights will still be available, according to EPA guidelines.

The impact of newer bulb use will be gradual since older-type bulbs can still be used. The standard 100-watt incandescent bulb will be the first to go because U.S. companies cannot manufacture it next year. Manufacturers such as Sylvania are replacing the 100-watt with a next-generation incandescent filled with halogen that uses 72 watts of electricity but produces light intensity equivalent to or brighter than the traditional 100-watt bulb. Manufacturers already have been supplying stores with lower wattage standard bulbs as another energy-saving tactic. For example, a standard 60-watt has been reduced to 57 watts and the 100-watt is now 95 watts. They lessen brightness a bit but save energy.

LED bulbs are another option, but they are very expensive. Bulbs can range from \$40 to \$50 but last up to 20 years based on average use.

Marketing studies, however, have found that men buy compact fluorescents to reduce their energy bills, while women and seniors prefer the warm and brighter light of

incandescent or subdued compact fluorescent bulbs. Store managers say the CFL is the best value energy-wise for customers because it uses one-fourth the energy of an incandescent bulb and lasts up to six times longer, depending on daily usage. A 23-watt CFL can save half the energy a standard 100-watt uses in a single year and \$60 in lower electricity costs over a six-year life. The new improved halogen incandescent will save only \$14, but some consumers may prefer it because it casts a more traditional lighting hue.

While they save on utility bills, the downside of halogen, CFLs and LEDs is their upfront cost.

A standard 60-watt incandescent bulb may cost 40 to 50 cents compared with \$2 to \$3 for a compact fluorescent and considerably more- \$40 to \$50- for an LED.

There are other drawbacks to CFLs. They cannot be used with a dimmer and they are more hazardous because they contain a small amount of mercury. It is illegal to put them into the trash and no light bulb should ever be put into a recycling bucket. The public can drop the bulbs off at a Home Depot or other home improvement center for recycling. They can also be taken to a county hazardous waste collection site or to hazardous waste collection events.

Governments at all levels have been converting to more "green energy" lighting for several years and installing new bulbs in offices and in traffic signals. For example, the Camden County Board of Freeholders in New Jersey has spent more than \$1 million installing CFLs and LEDs in old and new light fixtures and expects to cut its energy consumption by the same amount.

How energy-efficient is your building?

**Update on LED Lighting**

As prices begin to fall and performance rises, LED (light emitting diode) lighting is becoming increasingly attractive.

The energy efficient technology has made great strides in price, lifecycle, and color quality in recent years. It's quick pay-backs, adaptable components, and greater indoor applicability are making LEDs grow in popularity.

Current innovation is focusing on optimizing the whole design around the LEDs thermally, optically, mechanically, and aesthetically. Specifically, work is being done to increase lumens per watt, better control brightness and intensity, manage heat, provide more consistent color quality, and utilize computer-based applications.

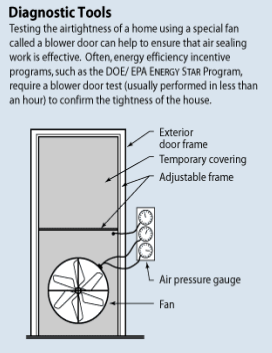




## **Blower Door Test**

Professional energy auditors use blower door tests to help determine a home's air tightness. These are some reasons for establishing the proper building tightness:

- Reducing energy consumption due to air leakage
- Avoiding moisture condensation problems
- Avoiding uncomfortable drafts caused by cold air leaking in from the outdoors
- Making sure that the home's air quality is not too contaminated by indoor air pollution.



A blower door is a powerful fan that mounts into the frame of an exterior door. The fan pulls air out of the house, lowering the air pressure inside. The higher outside air pressure then flows in through all unsealed cracks and openings. The auditors may use a smoke pencil to detect air leaks. These tests determine the air infiltration rate of a building.

They consist of a frame and flexible panel that fit in a doorway, a variable-speed fan, a pressure gauge to measure the pressure differences inside and outside the home, and an airflow manometer and hoses for measuring airflow.

There are two types of blower doors: calibrated and uncalibrated. It is important that auditors use a calibrated door. This type of blower door has several gauges that measure the amount of air pulled out of the house by the fan. Uncalibrated blower doors can only locate leaks in homes. They provide no method for determining the overall tightness of a building. The calibrated blower door's data allow the auditor to quantify the amount of air leakage and the effectiveness of any air-sealing job.

To learn more about this energy-saving test, see:

[http://www.energysavers.gov/your\\_home/energy\\_audits/index.cfm/mytopic=11190](http://www.energysavers.gov/your_home/energy_audits/index.cfm/mytopic=11190)

## **Lighting Phase-Outs**

Manufacturing for 100W incandescent bulbs and T12 fluorescent lamps ends in December 2012. This represents another step by the federal government to gradually remove inefficient lighting technologies from the marketplace. The phase-out began in January 2012. It will be followed by the phase-out of 75W bulbs in 2013, and 60W and 40W bulbs in 2014.

## **Thermostat Myth**

A common misconception associated with thermostats is that a furnace works harder than normal to warm space back to a comfortable temperature after the thermostat has been set back several degrees, resulting in little or no savings. This misconception has been dispelled by years of research and numerous studies.



The fuel required to reheat a building to a comfortable temperature is roughly equal to the fuel saved as the building drops to the lower set back temperature.

Fuel is saved between the time that the temperature stabilizes at the lower level and the next time heat is needed. So, the longer the dwelling remains at the lower level, the more energy is saved.

## **Ductwork**

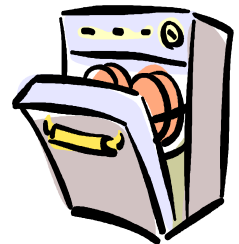
A duct system that is properly sealed and insulated can reap major benefits, such as:

- Improve comfort– Lessen the problem of rooms being too cold in the winter or too hot in the summer.
- Enhance Indoor Air Quality– Reduce the risk of pollutants circulating through the dwelling.
- Promote Safety– Avoid “backdrafting” of combustion gases from gas appliances.
- Lower Energy Bills– Leaking ducts can reduce HVAC efficiency by as much as 20%.
- Protect the Environment– By using less energy, you help to reduce power plant emissions and fight global warming.



## **“Smart” Dishwashers**

The latest model dishwashers are employing turbidity sensors that monitor the soil levels in wash water during the dishwasher cycle. These sensors shine a light through the water and read how much light makes it through the water. If the light is blocked by soils, the sensor will add more water and temperature to remove the soils from the dishes. Conversely, if the sensor detects low soils, the dishwasher will use the least amount of water and energy and still get the dishes clean.



### **Financing Energy Efficiency Improvements**

Owners are reporting positive results from incorporating energy-efficiency features in multifamily housing and many are responding to these energy savings by adopting efficiency features throughout their portfolio. Over the long term (10-15 years), such improvements can free up capital for property owners for other maintenance and improvement needs by reducing operating costs. Efficiency improvements have become more commonplace in maintaining multifamily housing, including using fluorescent bulbs, Energy Star appliances, environmentally friendly products, and incorporating recycling as part of our normal maintenance procedures. Such modest investments can produce energy-efficiency gains of 25 to 30%, making units more energy efficient, reducing operating expenses for tenants and owners, and providing owners with better access to low-interest, long-term financing.



One financing vehicle for such energy efficiency improvements is Green Refinance Plus— an enhancement of the existing Risk-Share program in which FHA assumes 50% of the risk of loans for refinancing or property acquisition underwritten and issued by Fannie Mae's lending network. In Green Refinance Plus, at least 5% of these loans is dedicated to renovations or green retrofits, and FHA insures this portion of the loan under relaxed but still responsible underwriting standards. This way, FHA can demonstrate the cash-flow benefits of green retrofits, but borrowers will not default even if the improvements do not yield the expected savings.

The private sector is also starting to recognize this potential market. Bank of America recently announced the availability of \$55 million in low-interest loans to community development financial institutions (CDFIs) for energy-efficiency programs. The financing is intended for CDFIs that have started pilot programs to finance energy savings in multifamily retrofits. Most of these funds will provide long-term financing to 12 CDFIs judged to have the most effective, nationally applicable solutions for funding energy-efficiency improvements. The Bank of America will work with Bright Power to track the energy and water savings post-retrofit in buildings funded through the program.

One area of focus for the Bank of America's program will be finding a scalable model for stand-alone retrofits (that is, retrofits not connected to the mortgage initiation or

refinancing). These investments are particularly difficult to finance because the risk for the lender is not bundled with other, less risky investments. In addition, because loans for retrofits are relatively small compared with the mortgage for an entire building, underwriting costs will be much larger relative to the expected return, making the loan comparatively more expensive. Moreover, owners of properties with individually metered utilities do not capture the energy savings from retrofits, which limits the revenue that can be applied to debt payments. However, stand-alone retrofits have the benefits of stabilizing tenants through decreased utility costs and increasing owners' solvency because of the net increase in cash flow.

Utilities' investments can provide multifamily owners with much-needed capital for energy-efficiency retrofits, but an even more basic need is for more data to help owners and lenders assess energy savings. The innovation and collaboration currently underway in the multifamily green retrofit market to address such problems are encouraging. These developments may soon make capturing the untapped energy savings in the multifamily sector a reality.

For additional details, see: [www.huduser.org/portal/periodicals/em/summer11/highlight1.html#title](http://www.huduser.org/portal/periodicals/em/summer11/highlight1.html#title)

### **Energy Star Most Efficient**

The EPA and DOE have begun a pilot program, to promote the market's most energy efficient products— ENERGY STAR Most Efficient.



This designation, created as a complement to the familiar ENERGY STAR mark, will recognize the most energy-efficient products that have already qualified for ENERGY STAR

Like the ENERGY STAR mark, the Most Efficient designation will help consumers to easily identify the top tier of energy-efficient products. This year, the new designation is being awarded for clothes washers, heating and air conditioning equipment, televisions, and refrigerator-freezers. The EPA plans to consider more product categories in 2012.

### **Quick Energy Fact**

Although the price of natural gas has roughly doubled in the past year, as demand has increased, it still remains an energy bargain. Natural gas in our area is 61% less expensive than heating oil, 68% less expensive than propane, and 72% less expensive than electricity.



**Warm or Cool Bulbs?**

Four of today's commonly purchased incandescent bulbs (i.e., 100-watt, 75-watt, 60-watt and 40-watt ) have been targeted for replacement by more energy-efficient ones. They are in the crosshairs because much of the power they consume is released as heat, not light.



As of Jan. 1, 2012, a bulb that puts out the same amount of light as yesterday's 100-watt bulb is required to draw only 72 watts of power. In January 2013 and January 2014, similar new standards will go into effect for the other three light wattages.

A new phrase to watch for is "halogen incandescent." These are the light-bulb makers' answer to the new standards. Halogen bulbs, like regular incandescent bulbs, use a tungsten filament encased in a halogen gas-filled capsule, so the light quality and color are intended to be similar. These new bulbs are about 25 percent more energy-efficient than standard bulbs.

Compact fluorescent bulbs, however, are 75 percent more efficient, last 10 times longer and, while they're more expensive, can pay for themselves in nine months. And while some CFLs still take a while to reach full brightness after you turn them on, the technology is improving. It's possible to find instant-on and dimmable models that don't bathe your living room in a glow reminiscent of the office bathroom.

To help consumers choose the proper bulbs, the Federal Trade Commission has started requiring light-bulb makers to adorn packages with a new "Lighting Facts" label that lists brightness in lumens- a measure of the amount of light a bulb produces. The package label also specifies how "warm" or "cool" the bulb's light will be. Many consumers have only a vague idea what these terms mean. The Department of Energy has a useful chart online that can help you figure out whether the bulb you really like is warm or cool:

[www.energysavers.gov/your\\_home/lighting\\_daylighting/index.cfm/mytopic=12030](http://www.energysavers.gov/your_home/lighting_daylighting/index.cfm/mytopic=12030)

**Light Bulb Energy Savings**

The first phase of the Energy Independence and Security Act's ban on incandescent light bulbs began in January 2012. Did you know, however, that although replacement CFL and LED light bulbs are much more expensive than traditional incandescent bulbs, they are cheaper in the long run?



Just compare these costs:

*Incandescent*

- Initial Purchase Cost: \$.50
- Life: 1 Year
- Six Year Energy Cost: \$72.30

*CFL*

- Initial Purchase Cost: \$3.00
- Life: 6 Years
- Six Year Energy Cost: \$16.62

*LED*

- Initial Purchase Cost: \$20-\$40.00
- Life: 125-30 Years
- Six Year Energy Cost: \$5.00

**Energy Star Office Equipment**

Your management office could save on its electrical expense by converting to Energy Star office equipment.



Just consider these savings:

Equipment	Annual Savings Per Unit (kWh)	Annual Cost Savings PU
Computers		
Monitors	200-300	\$20-37
Copiers	236	\$24
Fax Machines	101	\$10
Printers	45	\$ 4

Not only is new Energy Star equipment more efficient, it also typically features a low-power sleep mode for inactive equipment. Such power management features help cut the energy consumption of equipment that workers can't or won't turn off.

### **Submetering– Tracking Energy Expenditures**

The following article appeared in Sustainable Communities e-News:

In recent years, the federal government has encouraged developers to reduce energy consumption in commercial and residential buildings.



In October 2009, President Obama signed Executive Order 13514, which outlines 23 goals for minimizing energy use, reducing greenhouse gases, and increasing the use of renewable resources. In its recent report, Submetering of Building Energy and Water Usage, the National Science and Technology Council Committee on Technology offers an innovative and nuanced way to address and assess buildings' energy consumption: submetering, or installing devices that take nearly continuous measurements at the smallest levels- even down to the amount of energy used by a single plug. Although submetering by itself does not reduce energy expenditures, it can be a useful way to analyze the effectiveness of conservation technologies and identify opportunities for saving energy.

What makes submetering especially attractive is that it can benefit a wide range of stakeholders. For example, with the detailed information provided by submetering, building owners can better and more efficiently control a building's water and energy use, thereby creating a more comfortable environment for all tenants. Submetering shows facilities managers exactly where utilities need to be better controlled, and identifies sources of atypical energy use. Submetering a building in the University of California school system, for example, showed that overnight lighting and natural gas systems were operating at unnecessarily high levels. With that information, facilities managers were able to make changes that reduced energy expenditures.

Submetering can also detect systemic problems within energy or water systems that might otherwise go undetected until the utility bills arrive. For example, Adobe Systems installed water meters in three of its buildings to track the amount of water lost to evaporation and leaks. Installing the submeters cost \$43,000; the company reduced its water use and saved \$12,000 on its sewage treatment bill in the first year alone, because sewage treatment bills are often calculated based on water use.

When installed at the individual unit level, submetering demonstrates to tenants how they use energy and water. With that knowledge, tenants can then make behavioral changes aimed at reducing energy expenditures. For instance, the New York State Energy Research and

Development Authority showed that submetering in rent-stabilized housing resulted in utility savings of 18 to 26 percent.

Finally, submetering is an effective way to assess where to install energy-saving technologies and to track whether these new technologies are producing the promised savings. One way of paying for the initial costs of installing submeters is to enter into a contract with an Energy Services Company (ESCO). Through these contracts, the ESCO pays for the installation of green technologies, including submeters. The customer then pays for the cost of the installation over time, out of the savings in energy costs that have been realized.

Although it does not save energy on its own, submetering is an effective way to track energy use and to implement programs and technologies that conserve resources and lower utility bills. Working with ESCOs is one way to manage the up-front costs of installing submetering technology.

### **Data Loggers**

A data logger is a device that measures and records physical or electrical parameters over a period of time.

They can be used in a project to insure that building systems are operating at peak efficiency. Costing only about \$100, they can measure temperature, humidity, carbon dioxide levels, motor run times, electricity usage, and on/off cycles.

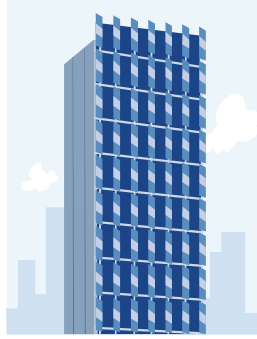
Once configured to your computer, data loggers are attached to a system via a magnetic strip, which then detects the magnetic field generated when a system is turned on. They then provide specific system-by-system statistics that can be plotted out on a graph to identify inefficiencies.





**Energy Savings in Retrofit Buildings**

A recent study sponsored by the Deutsche Bank Americas Foundation and Living Cities could result in changes to the energy-efficiency retrofits market. *Recognizing the Benefits of Energy Efficiency* is a comprehensive effort to quantify the benefits of energy efficiency retrofits in multifamily housing.



The study provides empirical data on energy consumption before and after building retrofits, filling the void where the absence of evidence has stifled demand among owners and kept lenders from creating loan products to finance the cost of building improvements. In addition to illustrating how building retrofits can save energy, the study provides a framework for incorporating energy savings into lenders' underwriting standards.

The study included the development of a comprehensive database of 231 multifamily housing projects (composing more than 21,000 units) in New York City that had been retrofitted with energy-efficiency improvements. The database includes pre- and post-retrofit utility costs (gas, oil, and electricity bills), building and tenant characteristics, and recommended and implemented energy conservation measures, among other variables. The detailed data allowed for a robust analysis of energy savings in fuel and electricity consumption across a representative sample of multifamily buildings in the city.

The study found that after retrofitting, the projects showed an average savings of 19% in fuel consumption and 7% in electricity consumption.

You can read or download the complete study at:

[http://huduser.org/portal/sustainability/newsletter\\_072512\\_3.html#1](http://huduser.org/portal/sustainability/newsletter_072512_3.html#1)

**Quick Energy Fact**

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**DE Project Receives Winterization Help**

Recently the DE WAP (Delaware Winterization Assistance Program) provided home performance retrofits to 105 units at Marydale Retirement Community, a Section 202/8 project located in Newark, DE. The apartments, owned by The Catholic Ministry to the Elderly, Inc. and managed by Catholic Charities, are grouped in 9 individual courts, with 12 apartments per court spread out over 18 acres.



The homes were weatherized using air sealing methods to keep out the outside air and adding insulation to the attic. They typical home saw a 35% reduction in the amount of air leaking to the outside. The community as a whole had over 35 tons of insulation blown into their attics.

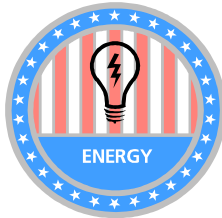
This was a multi-cooperative accomplishment with DNREC taking the lead role in coordination. The actual work was the responsibility of NHI (Neighborhood House Inc) using its contractors to audit and do the daily managing, and the actual installation of the weatherization measures. While the primary contractor on this project was Community Services Corporation, 11% of the units were weatherized by Eastwind Enterprises. However, none of this could have been accomplished without the patience, tremendous time, enthusiasm and attention to detail from the Marydale staff and its residents.

Many tenants are already reporting increased comfort and undoubtedly they will experience reduced energy consumption (i.e., lower bills this winter). The DE WAP was happy to work with the management and staff at Marydale and appreciate their efforts to make this a successful project.

Inquiries for DE WAP should be directed to Jack Sol-Church at NHI 302-483-1181.

## Energy Saving Ideas

The General Services Administration is currently testing the following energy-saving technologies on federal buildings:



- **Electrochromic windows:** These are windows that switch from a clear to a dark state based on light sensors.
- **Glazing Retrofit Coating:** Clear water-based spray-on window coating is designed to reduce heat without significantly reducing light.
- **Vacuum-sealed Roof Insulation:** A thin insulation material can provide thermal resistance up to 5 times greater per unit of thickness than polystyrene or polyurethane insulation and up to 10 times greater than glass wool.
- **Central Plant optimization:** Chillers, cooling towers and associated pumps act as a single system to reduce pumping energy and runtime.
- **Wireless Lighting Control Systems:** Enables switches, fixtures, and sensors from a variety of manufacturers to communicate as a single system by using wireless area controllers.
- **LED Retrofit Luminaire:** Replaces fluorescent fixtures that consume 90 watts with an identically-sized light-emitting diode (LED) that consumes 44 watts.

## Boiler Maintenance

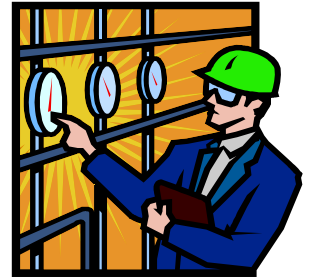
Proper boiler maintenance can avoid unnecessary energy waste. By following a few simple steps, your system can be operated in a safe and efficient manner:



- Make sure that the tubes and traps are clean and clear.
- Prevent corrosion by de-aerating the water in the system to get rid of dissolved gases.
- Check for air leaks around the boiler seals, at the ends of tube bundles, and at access doors.
- Make sure that the fuel-air ratio is set at optimum levels. (can be checked with a flue gas analyzer).
- Make sure that the seals are tight on all of the mechanical devices (i.e., gauges, safety interlocks, valves, pumps, burners, fans, and ash-handling units).

## Recording Gas & Electric Meter Readings

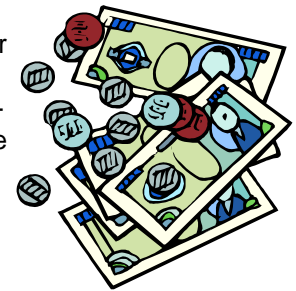
To insure that heating systems are operating at their peak efficiency this winter, gas and electric meter readings should be recorded daily.



This simple task will allow maintenance staff to catch problems, like a stuck damper, immediately, to avoid unnecessary increases in utility usage and costs.

## Calculate Retrofit Savings

Did you ever wonder how much your project will save on energy conservation retrofits? You can now calculate these savings by following these four steps:



- Quantity of existing fixtures x wattage of existing fixtures/1000= *kW demand reduction*.
- Quantity of existing fixtures x wattage of existing fixtures x annual hours of use/1000 minus Quantity of proposed fixtures x annual hours of use/1000= *annual kWh savings*.
- Annual savings x charge per kWh from utility= *annual dollar savings*.
- Cost of installation minus incentives/annual dollar savings= *net payback period*.

(Source— *Buildings*, March 13, 2013).

## Most Efficient Lighting



The most efficient light output per unit of energy is high intensity discharge at 75 lumens per watt. Here is how the other sources of outdoor lighting measure up:

- Linear fluorescent— 74
- Compact fluorescent— 55
- Light-emitting diode (LED)— 45
- Halogen— 17
- Incandescent— 12

## **Ductless Heating & Cooling**

ENERGY STAR certified ductless heating and cooling systems are highly efficient products that deliver warm or cool air directly into different zones in a home, instead of routing it through ducts first. They are also called mini-split, multi-split, or variable refrigerant flow (VRF) heat pump systems.

They are an increasingly popular, cost-effective solution to replace inefficient baseboard electric heating and window air conditioners in older dwellings. They are also used in new construction, home additions, multifamily (condo or apartment) housing, and to improve comfort in poorly heated or cooled rooms.



ENERGY STAR qualified ductless heating and cooling systems:

- Saves money. Heating and cooling costs the average homeowner about \$1,000 a year- nearly half the home's total energy bill. Replacing an existing system with an ENERGY STAR certified model could cut heating and cooling costs by 30%.
- Provides more comfort and control. In traditional heating and cooling systems, there is generally only one thermostat that controls the temperature of an entire dwelling. With ductless heating and cooling systems, you can have control over the temperature of each zone.
- No ducts are required. The indoor components are mounted directly on the wall. A variety of attractive options are available from ENERGY STAR partners. Traditional forced-air heating and cooling systems use ducts to distribute conditioned air throughout the dwelling. Typically, however, about 20% of the air that moves through the duct system is lost due to leaks, holes, and poorly connected ducts. With ductless heating and cooling, duct losses are eliminated- improving comfort, and saving money.
- Delivers both heating and cooling. Ductless heating and cooling systems are often a convenient, single solution for dwellings that formerly relied on electric baseboard heaters in the winter and window air conditioning units in the summer.
- Are proven technology. Ductless heating and cooling systems have been around for over 30 years and are used widely throughout the world.

## **Top Energy-Efficient Technologies**

The GSA's Green Proving Ground has released the results of several studies of energy-efficient building technologies. The studies supported the use of the following:



- Condensing Boilers— ultra-efficient water heaters that use waste heat to pre-heat cold water entering boilers.
- Variable Refrigerant Flow— HVAC technology that can simultaneously heat and cool different areas of facilities to enable tighter temperature control.
- Photovoltaic Panels

The complete studies can be read at: [www.gsa.gov/GPG](http://www.gsa.gov/GPG)

## **LEDs Going Wall-to-Wall**

LEDs are no longer just light bulbs. They're now starting to appear as a built-in feature for ceilings — an advance predicted 50 years ago by science fiction writer Isaac Asimov.



These tiny light emitting diodes, often touted as the ultra-efficient replacement for old-fashioned incandescents, are being integrated into clothes, carpets and ceilings the same way that some solar panels have been tucked into rooftop shingles.

The OneSpace luminous ceiling, by lighting company Philips uses LEDs packed tightly in a mesh, combined with textile, to create an ultra-thin, sound-absorbing panel that offers homogeneous light with no exterior fixtures. Amid a plethora of new LED products, several companies including General Electric have introduced ceiling panels with built-in LEDs. Yet OneSpace comes in custom-made sizes so large — as much as 10 feet by 33 feet — that it can cover an entire ceiling.

"This innovation will redefine how light can be used in architecture and design," says Antoon Martens Philips' general manager of "large luminous surfaces." He says OneSpace, intended for commercial settings such as car showrooms and airports, will cost about \$191 per square foot. He says the panels can be hoisted down for maintenance, but given the long life of LEDs, he expects businesses will redecorate before the bulbs need replacement.

LEDs have been around for decades, but their popularity has soared in recent years as their prices have plummeted, their options have expanded and the U.S. government's phaseout of inefficient incandescents continues. Thomas Edison-era



incandescents use far more energy to produce light than LEDs and typically last about a year. LEDs, though their upfront costs are much higher, can last a decade.

Lighting companies have introduced LED replacements for the traditional screw-in bulbs that have been phased out, including the 40-watt, 60-watt, 75-watt and now the 100-watt incandescent. In March, Cree unveiled its latest -a \$20 replacement for the 100-watt incandescent that produces the same amount of light while consuming just 18 watts.

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### **High Efficiency (HE) Clothes Washers**

In recent years, sales of HE washers have grown- and today they're making a significant impact on the washing machine marketplace. With current energy and water legislation affecting design for future washers, this trend is expected to continue into the foreseeable future.



As of 2005, sales of HE washers have grown from less than 1% to more than 15% of the market in only 10 years.

HE washers use less water than traditional washers- in fact, they only use from 20% to 66% of the water used by traditional agitator washers. Energy use can be as little as 20 to 50% of the energy used by traditional agitator washers because there's much less water to heat. These savings translate directly to long-term cost savings for consumers- as well as significant long-term environmental benefits.

Unlike traditional agitator washers, most HE washers use a "tumbler" system with no agitator. Because the new systems are designed to be so efficient, HE washers can use low-water wash and rinse cycles. In many models the laundry is washed in a shallow pool of water. In fact, in some models, the water level is so low you may never even see a pool of water. Despite their reduced water levels, however, HE washers can wash the same amount of laundry per load as traditional washers- in fact, many can clean even larger loads.

There are two types of HE washers- front loading and top loading. Although each works via a different mechanical method, they both use considerably less water than traditional agitator washers. In front-loading washers, the

laundry tumbles back and forth through the water, as the tub rotates clockwise and then counterclockwise, moving the water and detergent through the laundry and removing soils. This repetitive tumbling motion is intended to do an efficient cleaning and rinsing job and is gentle on fabrics. All front loading washing machines use low-water levels in the wash and rinse process. Other HE washers load from the top. These washers offer gentle motion to do the laundry, using spinning, rotating, and/or "wobbling" wheels, plates, or disks to achieve the gentle wash action. As with some front-loading HE washers, some top-loaders also spray or lightly shower clothes using re-circulated water from wash and/or rinse solutions. Top-loading washers also use low-water volume wash cycles. They have either no center post or a smaller-sized center post (or impeller) instead of a traditional agitator.

HE detergents must work differently from traditional laundry detergents in order to be effective. They must be low-sudsing and quick-dispersing to get the best cleaning performance with HE washers. Detergents formulated for HE washers work with energy-saving technology to provide the best possible cleaning in only 20% to 66% the amount of water used in traditional washers.

As an added energy-saving bonus, most HE washers remove more water from your laundry than traditional washers do. Thus, since the load may be less wet when removed from the washer, there can be additional energy savings in the dryer

HE washers really are a smart choice.

### **Consumer's Guide to Energy-Efficient Homes**

Both renters and homeowners can benefit from home improvements that promote energy efficiency and improve indoor air quality. Raising the bar on air quality and energy performance at home helps reduce heating and cooling costs, saves energy, and improves occupant health and comfort.

To help consumers better understand the strategies and product options available to them, HUD's Office of Policy Development and Research has developed the *Guide to Energy-Efficient and Healthy Homes*. Additional information on a wide range of topics is available via links to other federal agencies and allied organizations, so that readers can easily jump from the *Guide's* brief overviews to more detailed, in-depth topical content. Consumers will also learn about home energy audits and health assessments, as well as financial incentives that may be available for those making energy-efficiency improvements.

We invite you to explore the new *Consumer's Guide* to begin identifying strategies to improve energy efficiency and air quality in your project. See: [www.huduser.org/portal/consumer/home.html](http://www.huduser.org/portal/consumer/home.html)



## **Better Buildings Challenge**

Multifamily housing retrofits provide a great opportunity to reap energy efficient savings. A 2009 report by McKinsey and Company estimated that there is an untapped \$16 billion energy cost savings in the affordable housing sector. In addition, last year, HUD-assisted owners and tenants paid an astounding \$1.1 billion and \$400 million, respectively, for utilities.



Everyone knows big impact that energy efficient upgrades can make on utility bills. But did you know that improving energy efficiency can also be an effective tool to preserve affordable housing due to non-energy benefits? These non-energy benefits, sometimes referred to as non-energy impacts, can be divided into the following four categories:

- **Societal (Environmental & Economic)**- The environmental benefits of energy efficiency include the amount of carbon dioxide equivalent emissions avoided and a decreased use of water. The economic benefits involve direct and indirect spending and purchases.
- **Utilities**— Utility companies can reduce their bad debts, emergency gas shutoff calls, collection costs, rate subsidies, and power outages.
- **Tenants**— Tenants struggling to stay financially afloat will receive lower bills. This will help to reduce energy insecurity, where some families must make the decision to “heat or eat.” Simply stated, when tenants experience savings, they are more stable in their homes and are able to relocate those savings to other household necessities.
- **Owners**— Owner will receive lower energy bills, decreased vacancy rates, lower operating and maintenance costs. Increased cash flow from these savings will give owners more funds to invest in their buildings or put into reserves.

This fiscal year, each HUD office has a goal to encourage the participation of project owners in the Better Buildings Challenge (BBC), a program that will help them overcome programmatic barriers that impede their ability to make critical energy-saving improvements. HUD, partnered with the Dept. of Energy, challenges owners to reduce their buildings' energy consumption, by 20%, over the next 10 years. To help accomplish this goal, HUD will be making several financial incentives available to owners and

management agents. Some of these incentives are:

- Invoicing of energy savings payments associated with property and tenant utility allowance reductions, as eligible budget expenses, in Section 202 and 811 projects.
- Additional distributions, for 10 years, for profit-motivated and non-profit owners of Section 8 projects.
- Management add-on fees of \$1/PUPM for best practices in energy and water management.
- Expedited approvals for “stand alone” green measures (not part of a larger rehab).
- An opportunity to seek HUD approval for On-Bill Repayment, On-Bill Finance, or utility tariff mechanisms for financing energy and water retrofits.
- Older Mark-to-Market (M2M) that adopt 75% of green energy measures and all the water conservation measures recommended in the Green PCNA can claim the Incentive Performance fee (IPF) that increases owner distributions.

If you want to participate in this exciting and financially rewarding program, please contact your Project Manager at your local HUD Program Center.

A BBC workshop will be held by the National Housing and Rehabilitation Association, on April 3, 2014, at The Hub Cira, located at 2929 Arch Street, Phila., PA. The \$150 registration fee is an eligible project expense. You can register for the one-day training at:

[www.housingonline.com](http://www.housingonline.com) (“Events”).

For additional information on the BBC program, see:

[http://portal.hud.gov/hudportal/HUD?src=/press/press\\_releases\\_media\\_advisories/2013/HUDNo.13-180](http://portal.hud.gov/hudportal/HUD?src=/press/press_releases_media_advisories/2013/HUDNo.13-180)

<http://www4.eere.energy.gov/challenge/>

### **Financing Energy Efficiency Measures**

The San Francisco Federal Reserve Bank, in last month's *Community Development Investment Review*, published an article on how to develop new and creative cross-sector partnerships with utilities, regulators, and influential energy efficiency allies to finance energy efficiency retrofits in affordable housing buildings. This article nicely supplements HUD's efforts to make low-income rental housing more energy efficient, as part of the Better Buildings Challenge.



The article can be read at:

<http://www.frbsf.org/community-development/publications/community-development-investment-review/2014/march/green-environment-energy/>

### **Multifamily Retrofit Report**

Energy and water consumption represent some of the largest operating costs in multifamily properties, estimated at \$22 billion per year in the US. The newly released *Energy and Water Savings in Multifamily Retrofits* report provides a detailed analysis of 236 multifamily properties that underwent energy and water retrofit projects from 2009 to 2012. The report includes results for the U.S. Department of Housing and Urban Development's Green Retrofit Program and the Energy Savers Program in Illinois and finds that there were significant energy savings and cost reductions for participating properties.

This is the first study to examine a large and diverse national data set containing pre- and post-retrofit utility data for both owner- and tenant-paid energy and water accounts. In addition to the findings themselves, the challenges faced in performing this research provide useful insights for others seeking to understand and execute energy and water retrofits in multifamily properties.

The report found that the Green Retrofit Program (GRP), implemented by the U.S. Department of Housing and Urban Development, reduced building energy consumption by 18%, and reduced water consumption by 26%. Energy Savers, a project of Elevate Energy and the Community Investment Corporation that targets heating systems in multifamily properties in the Chicago area, reduced gas consumption an average of 26%.

The report can be read in its entirety at:  
[http://www.sahfnet.org/multifamilyretrofitreport\\_2\\_1287596736.pdf](http://www.sahfnet.org/multifamilyretrofitreport_2_1287596736.pdf)

### **Ductless Air Conditioning**

A solution to provide air-conditioning to a room or office without HVAC ducts, is to install a ductless unit.



Typically, these units are compact- 2-3 feet long by 10 inches high- and they stick out from the wall about 8 inches. Tubing from the indoor unit connects to an outside compressor that shaped like a "briefcase." It is much more efficient and quieter than central air conditioning.

Although pricey- units start at \$3,200- this type of unit can result in a 43% reduction in your utility bill for heating and cooling, according to the U.S. Dept. of Energy.

### **Energy Conservation Resource**

The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit, 501(c)(3) organization, is America's leading center of expertise on energy efficiency. It was founded in 1980 by leading researchers in the energy field. Since then, it has grown to a staff of about 50. Projects are carried out by ACEEE staff and collaborators from government, the private sector, research institutions, and other nonprofit organizations. ACEEE focuses on three program areas:



- Energy policy (federal, state and local).
- Research (including programs on buildings and equipment, utilities, industry, agriculture, transportation, behavior, economic analysis and international).
- Outreach (including conferences, publications and the Ally Program).

It has an excellent website that it uses to advance energy efficiency policies, programs, technologies, investments and behaviors. Among the informative areas covered are national state and local energy policies; resident and home appliances; commercial buildings and equipment; behavior and human dimension; energy efficiency programs; and energy efficiency topics.

We encourage you to visit ACEEE's website at:  
[www.aceee.org](http://www.aceee.org)

### **PC Energy Thief**

Personal computers can draw a large amount of power, especially if you are running a high-end desktop. A typical PC consumes something like 300 watts. If you only use it for four hours every day, the other 20 hours it is on would be wasted energy. If electricity costs 10 cents per kilowatt-hour in your area, then that 20 hours represents 60 cents a day. Sixty cents a day adds up to \$219 per year. While it is possible to reduce this cost by almost half, through the use of energy-saving features, like "sleep mode" that automatically powers down the monitor and the hard drive, you will still be wasting \$100 per year.



So why do many users leave their PCs on at night, while not in use? The argument for leaving a computer on all the time is that turning it on and off somehow stresses the computer's components. That assumption has been proven false. If it were a significant problem, then machines would be failing all the time. In fact, the PC hardware, which is similar to that of a television, is very reliable.

There are several other advantages for turning off your PC:

- Fewer temporary system issues - Those who keep their machines booted up indefinitely are familiar with the little problems that crop up when a computer is in use for a long time. Strange little problems occur and they're often solved by a reboot. If you're essentially rebooting every day, you're giving your machine a fresh start. This helps avoid minor system issues.
- Quiet hours - When your machine is running, it's capable of making noise. The sounds of the fans can be bothersome if you're sleeping in the same room, but you also run the risk of the computer playing an alert or other sound unexpectedly.
- A longer-lasting machine - While you can never really know when your computer is going to fail, less stress placed on its components will contribute to a longer life.
- Risk of Power Interruption: Leaving your PC on for long periods of time exposes it to the potential risk of power spikes and surges, brownouts, blackouts and other problems.

So, unless you are on a network which upgrades software or backs up files night, you are using your machine as some sort of server, or you are running something like SETI@home and you want to produce as many result sets as possible, there is no need to leave your PC on when not in use for an extended period of time.

Save money for your office or Neighborhood Networks Center and turn those PCs off!

### **Roofing Resources**

*Buildings* has three informative articles on its web site concerning roofing requirements, roofing membranes and roofing decks.



See:

[www.buildings.com/article-details/articleid/9900/title/keeping-up-with-changing-roof-requirements.aspx](http://www.buildings.com/article-details/articleid/9900/title/keeping-up-with-changing-roof-requirements.aspx)

[www.buildings.com/article-details/articleid/9112/title/black-vs-white-roofing.aspx](http://www.buildings.com/article-details/articleid/9112/title/black-vs-white-roofing.aspx)

[www.buildings.com/article-details/articleid/10871/title/it-all-starts-with-the-roof-deck.aspx](http://www.buildings.com/article-details/articleid/10871/title/it-all-starts-with-the-roof-deck.aspx)

### **Smart Plug Strips**



A way to save on energy costs for computers is to use smart plug strips. These devices use timers, load sensors, or occupancy sensors to shut off power when they are not in use.

A strip with a timer can reduce energy at night and over weekends, while an occupancy sensor could be used to shut off some devices (such as speakers or the monitor) when no one is present. Some models cut power to selected peripherals, whenever the computer enters sleep, stand-by, or disconnected mode.

Smart plug strips can be especially useful in projects with Neighborhood Network Centers that use multiple computers.

### **LEDs Going Wall-to-Wall**

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These tiny light emitting diodes, often touted as the ultra-efficient replacement for old-fashioned incandescents, are being integrated into clothes, carpets and ceilings in the same way some solar panels have been tucked into roof-top shingles.

The OneSpace luminous ceiling, by lighting company Philips uses LEDs packed tightly in a mesh, combined with textile, to create an ultra-thin, sound-absorbing panel that offers homogeneous light with no exterior fixtures. Amid a plethora of new LED products, several companies including General Electric have introduced ceiling panels with built-in LEDs. Yet OneSpace comes in custom-made sizes so large- as much as 10 feet by 33 feet- that it can cover an entire ceiling.

"This innovation will redefine how light can be used in architecture and design," says AntoonMartensPhilips' general manager of "large luminous surfaces." He says OneSpace, intended for commercial settings such as car showrooms and airports, will cost about \$191 per square foot. He says the panels can be hoisted down for maintenance, but given the long life of LEDs, he expects businesses will redecorate before the bulbs need replacement.

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### **Ductless Air Conditioning**

Ductless, mini split-system air conditioners have numerous potential applications in residential, commercial, and institutional buildings. The most common applications are in multifamily housing or as retro-fit add-ons to houses with "non-ducted" heating systems, such as hot water heat, radiant panels and space heaters. They can also be a good choice for room additions and small apartments where extending or installing distribution ductwork (for a central air conditioner or heating systems) is not feasible.



Like central systems, mini splits have two major components: an air-handler unit mounted on an inside wall that delivers cool air to the room and an outdoor compressor/condenser. A conduit, which houses the power cable, refrigerant tubing, suction tubing and a condensate drain, links the outdoor and indoor units. The system also has thermostatic control and a variable quiet blower.

The main advantages of mini splits are their small size and flexibility for zoning or heating and cooling individual rooms. Many models have as many as four indoor air handling units (for four zones or rooms) connecting to one outdoor unit. The number depends on how much heating or cooling is required for the building or each zone, as well as the level of insulation. For comfort and energy efficiency, each of the zones has its own thermostat.

Ductless systems are also easier to install than other types of space air conditioning systems. They require only an 8 cm hole for the conduit and the outdoor unit can be located up to 50 feet away from the building. This makes it possible to cool rooms on the front side of a building with the compressor in a more advantageous or inconspicuous place on the outside. Also, they do not provide an entry point for intruders, like window air conditioners.

Since mini splits have no ducts, they avoid the energy loss associated with ductwork of central forced air systems. Duct losses can account for more than 30% of energy consumption for space conditioning, especially if the ducts are in an unconditioned space, such as an attic.

Compared with other add-on systems, mini splits offer more flexibility in interior design options. They can be suspended from a ceiling, mounted flush into a drop ceiling, or hung from a wall. Most indoor units have low 7" profiles and sleek, high-tech-looking jackets. Many also offer a remote control to make it easier to turn the system on and off.



### **Energy Star Certification**

The Energy Star certification system has been customized to apply to multifamily buildings. The certification will allow building managers to showcase sustainable practices while reducing energy costs for renters.



Over the past 10 years, energy costs for renters have increased 20%. Current estimates, however, show that multifamily properties could become 30% more efficient by 2020.

The rating system will provide scores ranging from 1-100, representing a building's percentile ranking compared to similar buildings. Any property scoring above 75 would be eligible for an Energy Star certification.

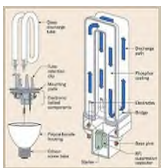
In addition, Energy Star has an online, interactive energy management tool, Portfolio Manager, that allows owners to measure and track their building's energy and water consumption, identify investment priorities, verify improvements over time, track weather-normalized energy use intensity (EUI), energy costs, greenhouse gas emissions, and water consumption.

This tool can be found at:

[www.energystar.gov/buildings/owners\\_and\\_managers/existing-buildings/find\\_resources\\_your\\_property\\_type/energy\\_star\\_multifamily\\_housing](http://www.energystar.gov/buildings/owners_and_managers/existing-buildings/find_resources_your_property_type/energy_star_multifamily_housing)

[www.energystar.gov/ia/business/multifam\\_housing/QRG\\_Multifamily\\_Housing.pdf](http://www.energystar.gov/ia/business/multifam_housing/QRG_Multifamily_Housing.pdf)

### **How Does a CFL Lamp Work?**



Compact florescent lamps (CFLs) produce light differently than incandescent bulbs. In an incandescent, electric current runs through a wire filament and heats the filament until it starts to glow. In a CFL, an electric current is driven through a tube containing argon and a small amount of mercury vapor. This generates invisible ultraviolet light that excites a fluorescent coating (called phosphor) on the inside of the tube, which then emits visible light. A CFL's ballast helps "kick start" the CFL and then regulates the current once the electricity starts flowing.

Although CFLs need a little more energy when they are first turned on, once the electricity starts moving, CFLs use about 70% less energy than incandescent bulbs

### **ENERGY STAR Dryer**

Adding to the more than 70 product categories covered by the program, ENERGY STAR has an exciting new product—clothes dryers. Those that earn the label are independently certified to be at least 20% more efficient than conventional models, delivering an average of \$245 in lifetime savings. Savings are even greater for consumers buying an ENERGY STAR washer-dryer pair.



Unlike clothes washers, which have seen a 70% drop in energy use since 1990, dryers have largely remained inefficient. Clothes dryers consume more energy than any other appliance in the home, and 80% of American homes own dryers. If all residential clothes dryers sold in the U.S. were ENERGY STAR certified, Americans would save \$1.5 billion each year in utility costs and prevent greenhouse gas emissions equivalent to more than two million vehicles.

As many as 45 certified models from Whirlpool, Maytag, Kenmore, LG and Safemate are now available in-store and online at prices comparable to standard dryers. Plus, several utilities across the country are offering rebates on select models.

For information on brands, retailers and rebates, visit:

[energystar.gov/newdryers](http://energystar.gov/newdryers)

### **Tankless Water Heating**

A good way to save energy costs is to switch to tankless hot water heating.

Tankless water heaters have several advantages over standard hot water heaters:

- Runs on electricity or gas.
- Provides an infinite supply of hot water.
- Only consumes energy when there is a need. Uses a microprocessor to determine proper temperature and flow rate.
- Saves space. Can be installed in utility closets, basements, attics, or outside.
- Can be scaled to size to meet project's demand.



If you decide to retrofit your project with tankless heaters, shop around for a plumbing company which has experience with this type of installation.

## **Renewable Energy and Energy Efficiency**

Secretary Castro has announced a number of actions to expand financing for energy efficiency and solar energy in multifamily housing. These actions will help to achieve President Obama's goal of installing 100 megawatts of renewable energy across federally subsidized housing by 2020.



To continue to reinforce American leadership in deploying clean energy and cutting energy waste, while creating jobs and reducing carbon pollution, the Administration and the State of California are partnering to announce the following actions:

- **Unlocking Property-Assessed Clean Energy (PACE) Financing:** Many owners of affordable housing do not have the capital available to invest in cost-effective energy upgrades, and face a number of barriers to borrowing money for these projects. HUD and California will be working together using PACE financing. Under PACE, a property owner avoids the upfront costs of energy saving installations by entering into assessment contract with a participating PACE locality. The property owner agrees to repay the cost of improvements through a property assessment, typically over 20 years with semi-annual payments.
- **On-Bill Repayment in Affordable Multifamily Properties:** HUD is committing to support the State of California in creating an innovative California Master-Metered Multifamily Finance Pilot Project. The Pilot will enhance affordable multifamily properties which have a substantial majority of a property's energy consumption billed through a common meter, and provide access to upfront capital for financing energy efficiency improvements on affordable terms and time frames, which are repaid through the master meter utility bill. The \$3 million program of technical assistance and credit support may include a loan loss reserve and/or a debt-service reserve fund.
- **Engaging Philanthropy and the Financial Sector:** More bridges will be built between the philanthropic, housing and energy sectors. As a first step, the MacArthur Foundation has committed \$10 million to upgrade and preserve affordable housing.
- **Empowering Communities to Deploy Solar:** The Department of Energy has recently awarded more than \$14 million for 15 projects, under its Solar Market Pathways program, that will develop plans, streamline deployment and launch innovative programs to spur solar market growth in numerous communities across the U.S. The awardees include not-for-profits, utilities, industry associations, universities, and state and local jurisdictions in NY, VA, DC, VT, CA, IL, MN, UT and WI.
- **New Commitments to Advance Energy Efficiency Investments:** In February 2011, President Obama launched the Better Buildings Challenge (BBC) to help American commercial, industrial, and multifamily buildings become at least 20% more energy efficient by 2020. More than 250 diverse organizations, representing over 3 billion square feet, 600 manufacturing plants and more than \$2 billion in energy efficiency financing have stepped up to the President's Challenge, including more than 85 new multifamily partners since the Challenge was expanded to multifamily housing. Since the Better Building Challenge began, partners are on track to meet the 2020 goal and on average, are cutting energy use by 2.5% each year, saving 36 trillion BTUs and \$300 million. The Administration is also calling on Section 202 Project Rental Assistance Contract (PRAC) properties serving elderly and disabled Californians to take advantage of the PRAC Shared Savings incentive HUD released in September 2014. The incentive allows owners to utilize realized utility bill savings to make needed energy and water improvements at their property as part of the BBC.
- **Making Energy Data More Accessible:** Better information helps building owners and residents understand when there are opportunities to reduce energy consumption, which saves money for tenants, owners and taxpayers. HUD spends nearly \$6.5 billion annually on utility costs for affordable housing properties and households and the first step to lowering these costs is understanding where they come from. The challenge is that many housing units are individually metered and billed, so it's hard for owners to get good data about energy consumption and costs. As part of HUD's work on data access, HUD will be publishing guidance that standardizes the approach owners and performance-based contract administrators use to appropriately assess the utility subsidy levels needed to offset tenant-paid utilities.

In summary, as Secretary Castro has stated, "Greening properties is good for the health and wealth of all Americans. That's why HUD is partnering with leaders from all sectors to reduce energy consumption and bring clean energy-like solar power to affordable housing. These measures are about investing- investing in communities, investing in American businesses, and investing in people."

### **Energy Savings for Elevators**

The energy efficiency and reliability of elevators has greatly increased in recent years due to technological advancements.

If your high-rise has elevators that are 15-20 years old, you should consider the following upgrades:



- **Replace the Drive System.** Older drives, such as motor generator sets, are continuously running, which can be very inefficient and contribute to a large waste of energy. They can also contribute to hidden energy costs in a building because they generate a lot of heat, which can require additional energy to cool the HVAC equipment.
- **Install a New Replacement Hydraulic Elevator** (if so equipped). An older and slower hydraulic motor likely uses 40-60 HP, compared to the 6-8 HP motor typical of a modern machine room-less (MRL) elevator. That means whenever the elevator is actively working, it's expending energy, whether it's hoisting the car or just leveling as it approaches the right floor.
- **Replace Lighting and Control Buttons.** The majority of older elevator cabs have T12 fluorescent lights that may have been upgraded to T8s, and a lot of them have halogen down lights that consume a lot of energy and give off heat. Many LED retrofits can be done with a small controller drive that mounts on the top of the cab.
- **Replace the Starter.** You can expect to save \$300-500 per year on this upgrade, the cost of which starts around \$2,500. The greatest savings with a new starter are from its protection against poor quality power that can lead to brownouts.
- **Install Controllers.** Check to see if local codes allow controllers with standby mode where the elevator will either shut off or reduce lighting and HVAC in the elevator while it's unoccupied.

(Source: [www.buildings.com](http://www.buildings.com))

### **Five Warm Weather Tune-Ups**

Here are five warm weather "tune-ups" for properties:



1. **Do an Outdoor Inspection-** Walk the perimeter of the property to check for peeling or cracking paint; inspect the gutter system; and inspect lawn-watering hoses and faucets.
2. **Get Outdoor Air Conditioning Units Ready-** Remove any debris from the fan area of central A/C units, and remove covers and change filters from window A/C units.
3. **Clean your Indoor Air-** Install high quality pleated polyester filters with ratings between 7-13 MERV (minimum efficiency reporting value) to remove dust and allergens. These filters provide a level of effectiveness compatible with absolute high-efficiency particulate air (HEPA) filters, but at a lower price. HEPA filters are the best, however, with a rating of 17-20. They catch 99.97% of all particles 0.3 microns or larger.
4. **Keep Indoor Temperatures Under Control-** Locate the thermostat on an inside wall and do not place heat-producing devices (e.g., lamps and TV sets) beneath a wall-mounted thermostat.
5. **Reduce Humidity-** Check the building's foundation, entrances to doors and windows for infiltration of humid air. Seal these openings with silicone caulk, weather stripping or plastic. Also, make sure appliances that produce moisture (e.g., clothes dryers and dishwashers) are properly vented to the outside.

### **Energy Conservation Incentives**



Any project planning a retrofit should review the Database of State Incentives for Renewables & Efficiency. It contains a comprehensive listing, by state, of all applicable policies and financial incentives.

The web site address is as follows:

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



## Foam Insulation



Insulation and a tight air seal are vital to keeping the temperature inside a building comfortable and consistent all year round. An effective solution that offers immediate and long-term cost savings is the replacement of your building's traditional fibrous insulation with high-performance spray foam insulation.

High performance spray foam insulation, such as Icynene, is a wise investment for owners who want to make significant improvements to their buildings that have a long-term, positive impact. Able to perform in all climates, spray foam insulation allows air-conditioning and heating systems to operate more efficiently. As a modern insulation solution, spray foam insulation expands rapidly to completely seal a building's walls, floors and ceilings and prevent air leakage.

Insulation experts note that quality spray foam insulation can noticeably reduce monthly cooling and heating costs, in some cases by up to 50%. Additionally, spray foam insulation helps minimize random airborne moisture and pollutants from entering a building. This is ideal for tenants suffering from seasonal allergies, an important consideration in the spring.

## Types of Air Conditioners

There are four types of air conditioners. Here are the pros and cons of each type:



### Central

- Pro: Life span is 15-20 years; uses existing ducts and registers; quiet; convenient to operate; and more efficient than window air conditioners.
- Con: Expensive to install if ductwork needed.

### Ductless Mini-Split

- Pro: Provides zone cooling without ductwork; provides heating and cooling; highly efficient; avoids energy loss associated with ductwork; easy to install; and works in all climate zones.
- Con: Expensive (can cost 30% more than adding a central air conditioner unit to an existing heating system with ductwork).

### Window or Portable Room

- Pro: Provides cooling to select spaces at an affordable cost.
- Con: Life span is only 10-15 years; and improper installation can result in significant air leakage.

### Evaporative Cooler

- Pro: Life span is 15-20 years; costs 50% as much to install and use 25% of the energy of a central air conditioning unit.
- Con: Requires more frequent maintenance; and is only suited for areas with low humidity.

## Cold Water Washing

Did you know that up to 90% of the energy used to wash clothes is spent heating water? That's why more people are washing their clothes in cold water. However, there are some things your tenants should know before they press the "cold" button on their washer's temperature selector.



- Use the right liquid detergent.
- Get a washer with a dedicated cold cycle.
- Save the warm wash for white fabrics.
- Only use hot water for items, like bedding, pet items, bathroom rugs and underwear and diapers to kill bacteria.

Energy Star states that almost 90% of the energy consumed by a washing machine goes to heating water. Switching from hot or warm water to cold water washing saves that energy. In fact, each household that makes the switch to cold-water washing eliminates about 1,600 pounds of carbon dioxide emissions a year, according to the Sierra Club. But if the benefits are so obvious, why haven't people made the switch before? Although cold water has long been used for certain garments, many people have assumed that only hot water could really get clothes clean. That's just partly true.

Heat is one of three main ingredients in cleaning clothes – mechanical energy (in the form of your washing machine agitating clothes) and chemicals are the other two, according to a recent *New York Times* article. So, you can take out one of the ingredients as long as you improve the others, James Danzinger, a senior scientist who works on detergents for P&G, told the *Times*.

Cold-water specific detergents do just that. Whereas older soaps only worked well with hot water, new cleaning agents are chemically formulated for cold water. These cold-water detergents perform the same as or better than traditional detergents, as rated by *Consumers Reports*. In fact, P&G's Tide Coldwater, one of many detergents specifically designed for cold water, is ranked



above many regular detergents on *Consumer Reports'* detergents' list,

Cold-water detergents also cost about the same as their warm-water competitors, with the additional benefit of reducing energy use by over three-quarters. This can add up to substantial savings every time you do laundry.

Washing clothes in cold water with cold-water detergents not only will save energy and money- it also will preserve fabric color. Hot and warm water washes can cause dark colors to fade, delicate fabrics to fray and shirts to shrink. If the label says "warm," it'll probably be fine in a cold wash.