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# Specifying Residential Appliances: Green Update

Energy-saving appliances reduce water use and enhance sustainability

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Residential design and construction, whether single family or multifamily, is increasingly becoming the focus of sustainable, or green building around the country. In early 2005, the National Association of Home Builders (NAHB) released voluntary Model Green Home Building Guidelines (available online at [www.nahb.org/gbg](http://www.nahb.org/gbg)). While they are developed for single-family homes, the guidelines also apply to multifamily and custom homes, as well as remodeling projects for existing homes.

At the same time, the U.S. Green Building Council (USGBC) has undertaken the pilot testing of the Leadership in Energy and Environmental Design (LEED®) rating system for homes. They describe it as “a voluntary initiative promoting the transformation of the mainstream home building industry towards more sustainable practices.” Affordable housing is a big part of this trend too, with the organizations above and with the Enterprise Foundation. This not-for-profit organization helps America’s low-income families with their struggle out of poverty by providing decent homes and safer streets. They have teamed up with other national organizations to create “The Green Communities Initiative,” a partnership of The Enterprise Foundation/Enterprise Social Investment Corporation (ESIC) and the Natural Resources Defense Council (NRDC), along with the American Institute of Architects, American Planning Association, and major corporate, financial, and philanthropic organizations. These efforts are aimed at helping architects, builders, owners, subcontractors, suppliers, and others, to incorporate the latest and best approaches to environmentally sound, energy-efficient practices in residential buildings.

## Green Factors

Within this residential green design work, architects can look at several areas to help make their buildings comply with these new and emerging green standards. One area that should not be overlooked is the specifications of residential appliances for several significant reasons:

**According to the U.S. Environmental Protection Agency’s (EPA) ENERGY STAR® program, heating and cooling represents only 45 percent of a typical home energy bill. The remaining 55 percent is attributed to fixtures and appliances of all types and sizes.**

**Energy Use.** Often, most of the architectural focus related to residential energy use is on the building envelope and the heating and cooling systems. However, according to the U.S. Environmental Protection Agency’s (EPA) ENERGY STAR® program, heating and cooling represents only 45 percent of a typical home energy bill. The remaining 55 percent is attributed to fixtures and appliances of all types and sizes.

## CONTINUING EDUCATION

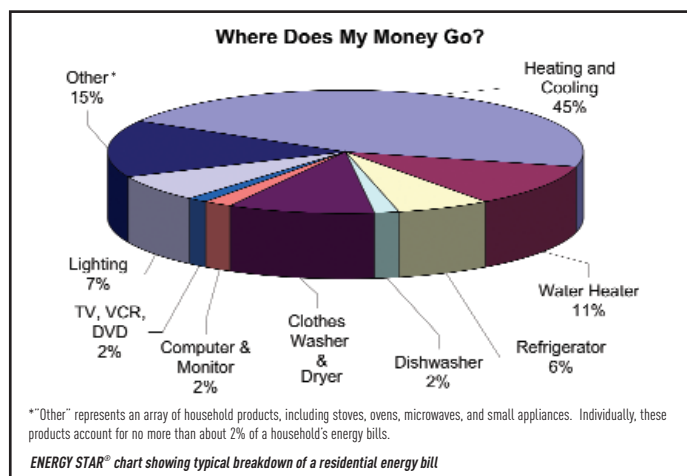


Use the learning objectives below to focus your study as you read **Specifying Residential Appliances: Green Update**. To earn one AIA/CES Learning Unit, including one hour of health safety welfare credit, answer the questions on page 345, then follow the reporting instructions on page 354 or go to the Continuing Education section on [archrecord.construction.com](http://archrecord.construction.com) and follow the reporting instructions.

### LEARNING OBJECTIVES

After reading this article, you should be able to:

- Identify the factors that make residential appliances environmentally sound and energy efficient.
- Understand the criteria and options for specifying “green” appliances.
- Identify organizations and resources that provide information about sustainability.



The Rocky Mountain Institute (RMI) observes that "Americans spend \$43 billion annually to run household appliances, which is an average of \$560 per year per family. If every household in the U.S. replaced old appliances with efficient models, they'd collectively save at least \$15 billion per year." While heating and cooling efficiency are important, it is at least equally important to pay attention to the energy efficiency of appliances that are specified into homes.

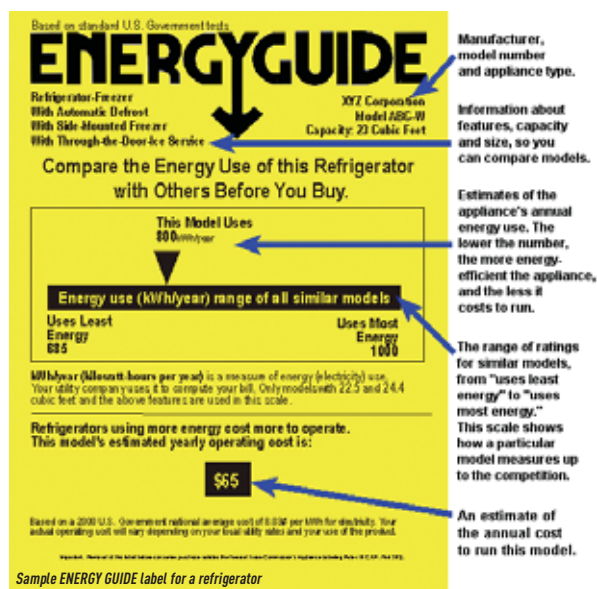
The significance of energy use goes beyond the monthly utility bill, however. Most of the electricity generated in the United States still relies on the burning of fossil fuels, which dumps carbon dioxide into the atmosphere. The current calculation is that one kilowatt-hour (kWh) consumed (or saved) equals 1.43 lb of carbon dioxide emitted (or saved) at the power plant. At an average of eight cents per kWh, the projected impact of \$15 billion in energy savings referenced above would prevent the emission of 175 million tons of carbon dioxide annually. This is significant since carbon dioxide is one of the leading gases attributed to the "greenhouse effect" and global warming. RMI notes that the average American household produces approximately 9,900 pounds of carbon dioxide a year, which means that the energy used in homes generates more greenhouse gas emissions than cars. Hence, specifying energy efficient appliances is good for the homeowner or renter who pays the energy bill, the atmosphere, and the environment.

The ENERGY STAR® Program sets standards for different types of appliances. Specifications qualify each type of residential appliance for the program.

| APPLIANCES   | SPECIFICATIONS FOR ENERGY STAR LABEL   |
|--|--|
| Clothes Washers  | * Minimum Modified Energy Factor (MEF) of 1.42.  |
| Dishwashers  | * At least 25% more efficient than minimum federal government standards.                   |
| Full Size Refrigerators, 7.75 cubic feet or greater  | * At least 15% more energy efficient than the minimum federal government standard (NAECA). |
| Full Size Freezers, 7.75 cubic feet or greater   | * At least 10% more energy efficient than the minimum federal government standard (NAECA). |
| Compact Refrigerators and Freezers Less than 7.75 cubic feet and 36 inches or less in height | * At least 20% more energy efficient than the minimum federal government standard (NAECA). |

Source: US EPA Energy Star Program web site [www.energystar.gov](http://www.energystar.gov)

**Energy Labeling Criteria.** When selecting energy-efficient appliances, observe the appliance labeling. Most appliances sold in the United States are required to display a yellow ENERGY GUIDE label (similar to mileage rating labels on cars), with a line scale in the center showing how each appliance model rates in energy use compared with similar models.



The estimated annual operating cost is listed below the scale, and the label gives factual, comparative information.

According to their literature, "ENERGY STAR® is a government-backed program helping businesses and individuals protect the environment through superior energy efficiency." ENERGY STAR® labels and logos are only awarded and displayed on appliance models that are tested and proven to consume 10 to 50 percent less energy than minimum federal efficiency standards.



ENERGY STAR® logo and label.

ENERGY STAR® labels apply to specific models, not just a manufacturer, so care should be taken to seek out labeled models. To learn which makes and models merit the ENERGY STAR® label, call 1-800-STAR-YES, or see [www.energystar.gov](http://www.energystar.gov).

**Water Use.** Many recent standards with an emphasis on energy use also include requirements to reduce water use. In 2001, the Associated Press indicated that by 2030, the implementation of the water saving provisions of recent environmental legislation will show that water use will be cut by 10.5 trillion gallons, and \$15.3 billion will be saved in electricity costs. According to the Green Guide, a GreenBiz News affiliate, "Residential water use accounts for about 10 percent of the water used in this country. This in no way diminishes the responsibility of every household to streamline use habits and invest in water-saving technology, though the consequence of doing so must be kept in perspective. In some regions, like the western U.S., where fresh water can be scarce, household consumption has a significant impact on the watershed, which affects salmon runs and the more poorly developed areas when water is diverted to supply new communities, resort areas, and agriculture." Responsible use of water is a serious and growing issue that can be addressed in plumbing fixtures, and electrical appliances that require water to operate, such as washing machines and dishwashers.

The U.S. Department of Energy states that, "Based on our estimates, a typical family with a home more than a decade old could save \$200 per year in electricity and water bills, and 18,600 gallons of water, by switching to highly energy- and water-efficient appliances. If

every American household installed these products, the annual water savings would equal the average flow of the Mississippi River into the Gulf of Mexico for five entire days." Water use in appliances is enough of an issue that the EPA is reportedly working on a water efficiency labeling program, similar to the ENERGY STAR® labeling program.

**Recyclable Content:** If a residential project involves remodeling and selective demolition of existing appliances, full consideration should be given to recycling those appliances. Currently, discarded appliances are second only to old automobiles as a source of recycled metals, particularly steel. Using recycled steel has a positive impact on the environment, since it takes four times as much energy to manufacture steel from ore as it does to make the same steel from recycled scrap. While steel is the most abundant recyclable component in appliances, other recyclables include metals like aluminum and copper, as well as plastics and the safe recycling or disposal of Chlorofluorocarbon (CFC) refrigerants. When specifying new appliances, architects should consider whether they are fully recyclable at the end of their useful lives. Some manufacturers indicate that up to 99 percent of their product can be fully recycled, becoming the raw material for the next generation of products and preserving other environmental resources in the process.

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Appliance recycling has become so significant that, since 1993, the Association of Home Appliance Manufacturers (AHAM) has facilitated the Appliance Recycling Information Center (ARIC). The mission of this center is "to serve as the authoritative source of information on the environmentally responsible disposal and recycling of appliances and to undertake research into the recycling of major household appliances." According to their web site ([www.aham.org/aric](http://www.aham.org/aric)), ARIC focuses its activities on "industry coordination and information and education." ARIC has initiated joint meetings of representatives from the major appliance industry, the steel recycling industry, plastics council, and scrap recycling companies. In September 1994, the Major Appliance Resource Management Alliance (MARMA) was founded to expand on the ARIC mission of increasing the recycling rate of major home appliances. Additionally, ARIC develops and makes available the most accurate technical data about appliance disposal and recycling, including advances in appliance recycling technology.

AHAM is also a co-sponsor with the Steel Recycling Institute of the Recycling Information Center. If owners or contractors have questions on recycling, they can call 1-800-YES-1-CAN to reach recorded messages and ask questions of live operators.

### Cost Implications

Every appliance has two price tags: a purchasing price and an operating cost. That's not counting the environmental and health costs of burning coal and other fossil fuels in power plants. Instead of comparing purchase prices with one another, the costs to operate the appliance over its useful life (usually 10 to 18 years) should be considered. Most, but not necessarily all, appliances designed for increased efficiency carry slightly higher initial purchase costs. However, the long-term savings are significant. For example, total water usage alone in efficient appliances might be reduced by one third, saving \$95 or more in a year, based on 2005 costs. Energy savings can be even more dramatic and create a quick payback for the small initial premium of a superior appliance.

### Specification Guidelines for Appliances

Based on the significance of appliances in green buildings, the following guidelines are suggested when preparing specifications for residential appliances.

### Refrigerators

Refrigerators are often the largest single energy-using appliance in a typical household and, consequently, are the most carbon dioxide-emitting appliances. A typical energy bill reflects almost as much energy use for a refrigerator (six percent) as lighting the entire house (seven percent). A new, more efficient refrigerator can typically save \$70 to \$80 per year, and will pay for itself in about nine years. The good news is that new energy efficiency standards for refrigerators went into effect in July 2001, requiring models to use 30 percent less energy than previous 1993 standards. Specifying a model that qualifies for the EPA's ENERGY STAR® label will save the user even more. On January 1, 2004, the ENERGY STAR® criteria for refrigerators changed, requiring that all refrigerators greater than 7.75 cubic feet must be at least 15 percent more efficient than the federal minimum standard.

When specifying energy-efficient refrigerators, Green Guide and Greenbuilder.com recommend the following:

- Specify an ENERGY STAR® rated, or better, refrigerator or freezer. Note that there are some models that just meet the requirements, and some that far exceed them. It is possible to specify more than just minimum ENERGY STAR® (i.e. 15 percent above federal standards) requirements and accept only models that exceed requirements (20 percent or greater than federal standards).
- Top freezer models are generally more efficient than side-by-side models. Side-by-side refrigerator/freezers are not only less energy efficient (particularly if they include water or ice dispensers), but also are more likely to need repair. RMI determined that these models use seven to 13 percent more energy than similar top freezer models.
- Manual defrost models use half the energy of automatic defrost models, but must be defrosted periodically to remain energy-efficient.
- Automatic icemakers and through-the-door dispensers will increase energy use by 14 to 20 percent. Given that these features also add to the sticker price, consumers would be better off using ice trays and skipping such models altogether, to conserve energy.
- The most energy-efficient models are the 16 to 20 cubic foot sizes.
- It is usually less costly to run one larger refrigerator rather than two smaller ones. Avoid the temptation to plan for separate units running in different locations. It's much more economical and ecological to ensure a single model is properly sized to meet user needs.

### Clothes Washers

Heating water generates up to 86 percent of the energy consumed by a clothes washer. Hence, specifications for washers should address both energy and water usage. Most sources agree that consideration should be given to horizontal axis (H-axis) front-loading machines. According to RMI, "These use about half to a third of the energy of conventional vertical-axis top-loaders because they need less water to get the same load just as clean. They also have a faster spin speed than vertical axis machines, meaning that clothes will require less drying energy as a result. The energy, water, and detergent saved will cut annual washing costs by about \$65, and pay back the higher up-front cost in three to nine years."

**Specifications for washers should address both energy and water usage.**

Greenbuilder.com has identified the following specification features and options that affect the amount of hot water used and the overall efficiency of a clothes washer:

- Wash and rinse cycles: Select a model with many choices. Warm wash cycles clean very well. Only oily stains may require hot washes. Cold-water washing is adequate with proper detergents and pre-soaking and cold rinses are effective. "Suds-saver" (reusing slightly soiled wash water) and pre-soaking are energy conserving options.
- Water level controls: Generally, washing a full load is most efficient, however, a small load should have the option of using a smaller amount of water.
- Water extraction: Higher spin speeds will reduce drying times.
- ENERGY STAR® rating: In addition to all the above, specify a model that meets or exceeds the ENERGY STAR® rating requirement for energy and water usage.



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### Clothes Dryers

The fundamental specification choice is between electric and gas-fired models. In terms of comparative energy use, gas dryers are generally less expensive to operate. However, since there is no requirement to display the Energy Guide label on clothes dryers, it is not easy to compare the energy use of various dryer models. Most sources agree that there is not a lot of variation in overall energy use between models. Typically, usage and running time dictate the amount of energy used.

Beyond fuel type, controls for turning off dryers become the major specification consideration for energy consumption. The first choice is whether or not the dryer uses sensors to automatically turn off the dryer once clothes are dry. The alternative is timed drying, leaving the running time, and corresponding energy use, to guesswork of the user. The best dryers have moisture sensors inside the drum for sensing dryness and turning off the machine. Most others only infer dryness by using temperature sensors in the exhaust air portion of the dryer, which may result in running the dryer longer than needed. Compared with timed drying, savings of about 10 percent with temperature-sensing controls, and 15 percent with moisture-sensing controls, are possible.

The ENERGY STAR® program currently does not rate clothes dryers, so the specifications should not reference it, but instead, stand alone.

### Dishwashers

As with clothes washers, there are two related issues for dishwashers, overall energy use and water use. A significant portion of the energy used by dishwashers is actually the energy required for heating the water they consume, since almost all dishwashers on the market use internal booster heaters. That is actually a good thing, because it allows domestic hot water heater temperatures to be turned down to around 120 degrees, instead of the higher temperatures usually desired for dish washing. The lower water heater temperatures mean less energy is used on an ongoing basis with the higher

***The ENERGY STAR® program currently does not rate clothes dryers, so the specifications should not reference it.***

temperature created only for the intermittent needs of the dishwasher. Specifying a dishwasher that requires less water to be heated and used by a dishwasher will result in more efficient operation. Many newer models have been documented to actually use half the water that conventional hand washing would require.

A significant specification detail is to call for a dishwasher that incorporates soil-sensors, since they adjust water use depending on how dirty the dishes are in each load. Recent improvements in test procedures better estimate the energy consumption of soil-sensing dishwasher models, allowing more accurate comparisons on the yellow Energy Guide labels.



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### Cooking Appliances

As with clothes dryers, the fundamental specification choice for cooktops, ovens, and ranges is for either electricity or natural gas as the energy source. In most cases, the level of energy use for any single cooking appliance is small enough, and modern efficiencies are high enough, that no appreciable difference may exist between specifying gas over electric. Collectively, all cooking appliances together in a home could add up to 6.5 percent or 750 kWh per year of a typical home's energy bill, so providing highly efficient units over less efficient ones will make a difference overall.

The ENERGY STAR® program currently does not rate cooking appliances, so specifications should not reference it. There are many other resources available, however, (see sidebar) so architects can readily find information to specify energy efficient and environmentally responsible appliances of all types. ■



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## ENERGY AND SUSTAINABILITY RESOURCES FOR RESIDENTIAL APPLIANCES

- ENERGY STAR® is a government-backed program helping businesses and individuals protect the environment through superior energy efficiency. ENERGY STAR® program information and rated appliances models are found at [www.energystar.gov](http://www.energystar.gov)
- U.S. Green Building Council (USGBC) and Leadership in Energy and Environmental Design (LEED) Standards are found at [www.usgbc.org](http://www.usgbc.org)
- National Association of Homebuilders (NAHB) represents residential builders nationwide. [www.nahb.org](http://www.nahb.org)
- Enterprise Foundation and information on the Green Communities Initiative. [www.enterprisefoundation.org](http://www.enterprisefoundation.org)
- American Council for an Energy-Efficient Economy (ACEEE) is a nonprofit organization dedicated to advancing energy efficiency and promoting economic prosperity and environmental protection. [www.aceee.org](http://www.aceee.org)
- Association of Home Appliance Manufacturers (AHAM) provides market industry trends on appliances. [www.aham.org](http://www.aham.org).
- Appliance Recycling Information Center (ARIC) provides information on recycling appliances. [www.aham.org/aric](http://www.aham.org/aric)
- Consumer Reports rates appliances. [www.ConsumerReports.org](http://www.ConsumerReports.org)
- Rocky Mountain Institute addresses energy and consumer issues. [www.rmi.org](http://www.rmi.org)
- The Green Guide is a GreenBiz news affiliate. <http://www.thegreenguide.com>
- Greenbuilder.com is an online resource with information about building and appliances. [www.greenbuilder.com](http://www.greenbuilder.com)

### CLICK FOR ADDITIONAL REQUIRED READING

The article continues online at [archrecord.construction.com/resources/conteduc/archives/0512bosch-1.asp](http://archrecord.construction.com/resources/conteduc/archives/0512bosch-1.asp). To receive AIA/CES credit, you are required to read this additional text. The quiz questions below include information from this online reading. To receive a faxed copy of the material, call 1-800-921-9622.

## AIA/ARCHITECTURAL RECORD CONTINUING EDUCATION Series

### LEARNING OBJECTIVES

After reading this article, you should be able to:

- Identify the factors that make residential appliances environmentally sound and energy efficient.
- Understand the criteria and options for specifying "green" appliances.
- Identify organizations and resources that provide information about sustainability.

### INSTRUCTIONS

Refer to the learning objectives above. Complete the questions below. Go to the self report form on page 354. Follow the reporting instructions, answer the test questions and submit the form. Or use the Continuing Education self report form on *Record's* web site—[archrecord.construction.com](http://archrecord.construction.com)—to receive one AIA/CES Learning Unit including one hour of health safety welfare credit.

### QUESTIONS

- The typical American residential energy bill attributed to appliances and other items not associated with heating and cooling is:
  - 45 percent
  - 11 percent
  - 55 percent
  - 35 percent
- The use of residential appliances that require less energy to operate have the potential to reduce greenhouse gas concentrations and global warming.
  - True
  - False
- The yellow ENERGY GUIDE label on an appliance indicates:
  - Energy saving potential above federal minimum standards.
  - Comparative performance and operating cost compared to other similar models.
  - Government endorsement of the appliance.
  - Performance of a manufacturer.
- An ENERGY STAR® label on an appliance indicates:
  - Overall performance of a manufacturer.
  - Annual cost to operate the appliance.
  - Compliance with federal minimum standards.
  - Test proven ability of appliance models to consume 10 to 50 percent less energy than federal minimum standards.
- ENERGY STAR® labels can be found on many types of residential appliances except:
  - Dishwashers
  - Refrigerators
  - Clothes dryers
  - Clothes washers
- Most appliances can be specified with recyclable materials of all except the following:
  - Steel
  - Plastic
  - Wood
  - Refrigerants
- When designing and specifying refrigerator units, it is usually more energy efficient to design in one larger unit rather than two or more smaller ones.
  - True
  - False
- In specifying clothes washing appliances, the single biggest factor for energy efficiency is:
  - The type of control.
  - The size of the machine.
  - The amount of water used per load.
  - The choice of manufacturer.
- In specifying clothes dryers, the most significant factor in energy use is:
  - Type of energy source.
  - Moisture sensors to turn off the dryer when a load is dry.
  - The ENERGY STAR® label.
  - The size of the machine.
- In specifying dishwashers, a significant factor in energy use is:
  - The presence of a "soil sensor" to adjust the amount of water used.
  - The type of hot water heater in the residence.
  - The amount of hand washed dishes.
  - The controls on the appliance.



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## Details for Specifying Cooking Appliances

Since the ENERGY STAR® program does not apply currently to cooking appliances, there are several things to keep in mind when specifying or selecting cooking appliances.

**Energy Source.** Be aware that many people prefer gas-fueled cooking appliances because they offer a greater level of control than electric ones, particularly with cooktop and stovetop burners. Since all-new gas ranges are required to have electric ignition, there is no longer the concern about wasting a continuous stream of energy from pilot lights. The potential downside to gas cooking appliances is the indoor air quality effects of gas combustion products. Specifying a ventilation fan that vents directly to the outside (not recirculating) becomes a significant component of gas cooking appliances. Choosing a conventional updraft hood or a downdraft hood can make a difference in the amount of make-up air that has to be heated or cooled to offset the exhausted air; downdraft hoods generally require several times more air than conventional updraft hoods.

**Ovens.** When specifying ovens, there are many alternatives to traditional electric and gas ovens, including convection ovens, microwave ovens, and combination models. Consider the following points:

- **Conventional Ovens.** With standard gas or electric ovens, self-cleaning models are more energy efficient because they have more insulation. Using the self-cleaning feature more than about once a month will use more energy than is saved from the extra insulation.
- **Convection Ovens.** These ovens can be more energy efficient than standard ovens because the heated air is continuously circulated around the food being cooked. Heat is distributed more evenly, and cooking time can be decreased. On average, convection ovens can reduce energy use by 20 percent, compared to conventional ovens.
- **Microwave Ovens.** Microwaves generally use one-half to two-thirds as much electricity as a conventional electric range or oven, particularly when used for reheating small portions. Because less heat is generated in the kitchen, residual savings may accrue from reduced air conditioning during the summer months.

**Cooktops and Rangetops.** When considering electric cooktops and rangetops, the not-for-profit American Council for an Energy-Efficient Economy (ACEEE) suggests the following:

- Solid disk elements are more attractive than coils and they are easier to clean up, but they heat up even more slowly than electric coils. Because solid disk elements take longer to heat up and higher-wattage elements are generally used, energy consumption will be higher. Good contact between the pan and the burner is especially important with solid disk elements.
- Radiant elements under ceramic glass are easy to clean and heat up faster than solid disk elements, though not as quickly as conventional coil elements. The energy efficiency of ceramic glass cooktops is higher than coil or disk element cooktops. As with solid disk elements, flat pans are important.
- Halogen elements use halogen lamps as the heat source under a glass surface. The lamp delivers instant heat and responds very quickly to temperature-setting changes. The heating efficiency of halogen units may not be better than with ceramic glass units, and halogen elements will provide only marginally faster speed.
- Induction elements are the newest and most innovative types of cooktops. The induction elements transfer electromagnetic energy directly to the pan, where heat is needed. As a result, they are very energy efficient, using less than half as much energy as standard electric coil elements. However, they work only with ferrous metal cookware (cast iron, stainless steel, and enameled iron). When the pan is removed, there is almost no lingering heat on the cooktop. Currently, induction elements are available only with the highest-priced cooktops. The extra cost is difficult to justify on the basis of energy savings alone.

Finding ways to reduce energy use and minimize the impact on the environment are among the goals of all green building efforts, including emerging residential green buildings. Paying attention to the specifications for residential appliances that require either energy or water to operate can contribute significantly to meeting those goals.

## LEED® for Homes and Appliances

The USGBC is in the process of pilot testing a new rating system applicable to “green” homes that use less energy and water than conventional homes, while making less of an environmental impact as well. The pilot rating system for homes is based on a total of 108 possible points in 8 categories as follows:

Location and Linkages (LL)  
Sustainable Sites (SS)  
Water Efficiency (WE)  
Indoor Environmental Quality (IEQ)  
Materials and Resources (MR)  
Energy and Atmosphere (EA)  
Homeowner Awareness (HA)  
Innovation and Design Process (ID)

In order to qualify as a “certified” LEED® home, certain pre-requisites, plus a minimum of 30 points out of the 108 point total, must be achieved. In order to qualify a higher level, points must be achieved as outlined below:

| LEED for Homes Performance Levels | Minimum Number of LEED for Homes Points required |
|-----------------------------------|--|
| <b>Certified Level</b>            | <b>30 points out of 108</b>                      |
| <b>Silver Level</b>               | <b>50 points out of 108</b>                      |
| <b>Gold Level</b>                 | <b>70 points out of 108</b>                      |
| <b>Platinum Level</b>             | <b>90 points out of 108</b>                      |

Under the category of Energy and Atmosphere (EA), appliances are addressed with the specific intent of minimizing energy demand for appliances. Under the rating system, a potential of up to three points toward LEED® certification can be achieved by specifying appropriate appliances for a home. The first two points can be earned by specifying and verifying installation of ENERGY STAR® appliances. One half-point each is available for a refrigerator, a dishwasher, and a clothes washer that all bear the ENERGY STAR® label. An additional half-point is also available for using ENERGY STAR® labeled ceiling fans in the house.

A full additional point can be earned by specifying a very efficient clothes washer beyond the ENERGY STAR® minimum. Such a clothes washer would need to demonstrate that it has a tested modified energy factor (MEF) of 1.8 or greater and a tested water factor (WWF) of less than 5.5. Selecting and specifying the proper appliances are the parts that architects or designers can control. However, the USGBC requires verification that these appliances are actually installed. An approved third party, referred to as a “rater,” will perform a visual inspection of the installed appliances and product labels to affirm that the specification criteria have been met. Then, the appropriate LEED® for homes paper work can be filled out and submitted. Carefully following this simple process will not only generate points toward certification, it will significantly reduce the amount of energy and water that the home uses by running appliances.

## CASE STUDIES

### Taino Plaza: Multi-Family Residential Building

Bronx, New York

Taino Plaza is an energy-efficient, mixed-use affordable housing and commercial building in the Bronx, NY, jointly developed by the South Bronx Overall Economic Development Corp. (SoBRO) and L&M Equity Participants, Ltd. Designed by Curtis + Ginsberg Architects, LLP of New York City, the building consists of 105 units of low and moderate-income housing, interior and exterior community space, and 18,400 square feet of commercial space. The architects worked with the client to obtain New York State funding for many energy-efficient upgrades, including high-efficiency heating and lighting systems, and photovoltaic solar panels on the roof. Specifying ENERGY STAR® appliances for this building was part of the overall, integrated strategy to design an energy efficiency building. The specifications called for these better-than-average appliances in the following areas:

- Apartments, allowing residents to minimize their energy usage.
- Community room, where residents and others use a common kitchen facility.
- Laundry room, where front-loading, water-conserving washing machines are heavily used by residents.

The building also received funding from the Bronx Initiative for Energy and the Environment, and the Bronx Borough President because of environmental elements in the design, including:

- Urban and site design for re-developing a former brownfield site, locating near mass transit, and judicious use of landscaping with trees for shade.
- Additional energy efficiency measures, including effective monitoring and control systems, building envelope attention to detail, and outside commissioning of the mechanical and electrical systems.
- Use of sustainable materials with recycled content, use of rapidly renewable materials, and recycling rooms on each floor.
- Indoor environmental quality, including ample use of daylight, operable windows for natural ventilation, and individual thermostats in each apartment.



Buildings such as this, which can potentially qualify for LEED certification, are helped in this process by installation of residential appliances that use less energy and water.

### Glidehouse In The Pacific Northwest: An Innovative Single-Family Residence

The Glidehouse is a new housing concept that combines green living in collaboration with nature and modern, efficient modular building construction. "The Glidehouse was designed

to be a modern, yet affordable and sustainable housing option," said Michelle Kaufmann, principal of Michelle Kaufman Designs, in San Francisco. "Building a Glidehouse results in very little waste, as it's assembled on-site from pre-fabricated modular components. It utilizes a variety of renewable and recyclable materials, such as bamboo flooring, a tankless water heater, and low-energy fluorescent lighting."

Located on Vashon Island, near Seattle, Washington, this show home is open to consumers, architects, and designers interested in learning more about the cost-effectiveness of modular housing and energy-efficient resources, including energy-efficient ranges, dishwashers, laundry and other appliances. The appliances are efficient and quiet. Highlights and features include:

- **Freestanding convection range:** The freestanding convection range is made of 100 percent recyclable materials. The oven controls include an easy-to-use system and a dial that controls up to nine cooking modes. A convection feature provides an additional heating element to ensure even cooking temperatures throughout the oven for faster and better cooking results.
- **Dishwasher:** The dishwasher demonstrates industry standards in quietness, energy, and water efficiency, includes concealed controls, and uses 3.1 gallons of water per cycle or less. Sensor technology monitors the soil level and adjusts the water level accordingly, saving water consumption, energy, and time.
- **Laundry System:** A high-efficiency clothes washer features a computer system that provides users with an easy way to get clothes clean while saving water, energy, and time. A compact washer-dryer system can be installed side-by-side or stacked to fit into a closet or other small space. The sensor system automatically determines the number of rinses, soak time, and spin speed for every fabric selection, ensuring precise results. This takes guesswork out of doing laundry, while also regulating energy and water use.
- **Over-the-range microwave:** For an integrated kitchen, a freestanding range can be paired with a built-in, over-the-range microwave oven. A 30-inch unit offers multiple cooking capabilities combined with a compact, efficient ventilation system. Features include sensor cooking with 10 power levels, a cooktop light, and controls. Ventilation features include a three-speed fan; replaceable, activated charcoal filter; and removable, re-usable mesh grease filter.



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