

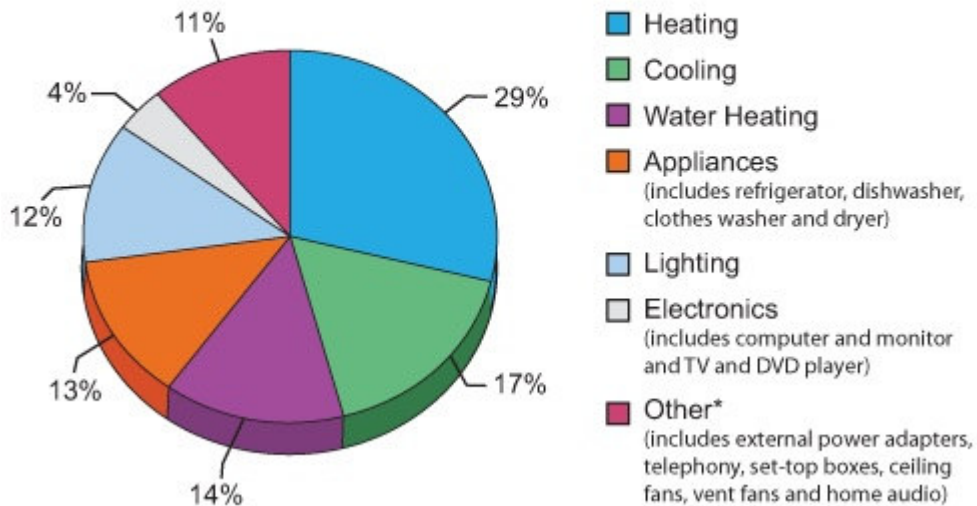
## Appliances Smart Enough to Save Money

By: Bill Zalud, Contributing Writer, Appliance Design

Little things add up. Replace a 75 watt standard light bulb with a comparable compact fluorescent light bulb(CFL) and, over the life of the former, the energy cost is \$45.36 while it is \$12.10 for the CFL.

### Where Does My Money Go?

Annual Energy Bill for a typical Single Family Home is approximately \$2,200.



*The annual energy bill for a typical single home is approximately \$2,200. Source: Typical House Memo, Lawrence Berkeley National Laboratory, typical house spreadsheet.*

Bigger things make a difference when it comes to Energy Star. Refrigerators use more electricity than any other household appliance. If a pre-1993 fridge is replaced, potential annual energy savings is \$70 with elimination of 1,720 pounds of emissions.

The biggest thing – the smart grid networked with intelligent, connected appliances – will make the biggest difference. There will be hundreds of millions of dollars saved in energy cost and efficiencies from remote appliance diagnostics.

It's cha-ching -- if.

Why the if? No doubt, it is recognized that providing an appliance with smart grid capability, i.e., products that meet the definition of a "smart appliance," is at least equivalent to a corresponding five percent reduction in operational machine efficiencies, according to a recent report for the U.S. Department of Energy by the Pacific Northwest National Laboratory(PNNL) of Richland, Wash.

The analytical model PNNL used in its cost/benefit analysis consists of a set of user-definable assumptions such as the definition of "on-peak" (hours of day, days of week, months of year), the expected percentage of normal consumer electricity consumption (appliance loads) that can be shifted from peak hours to off-peak hours, the average power rating of each appliance, etc. Based on these assumptions, PNNL estimated the wholesale grid operating-cost savings, or "benefits," that would be realized if the "smart" capabilities of appliances were invoked. The benefits considered were peak load shifting for some percentage of appliance loads and ancillary services provided by responsive appliance loads.

Specifically PNNL considered responsive or dispatchable smart appliance loads meeting power system needs for spinning reserves that would otherwise have to be provided by

generators. The rationale for this is that appliance loads can be curtailed for about ten minutes or less in response to a grid contingency without any reduction in the quality of service to the consumer.

The “if” falls into the hands of some homeowners, who are still not aware of the benefits of connected appliances and the smart grid or who may not be receptive to peak-loading shifting and spinning reserves, the capability of an appliance to respond to a signal that demands a response intended to temporarily reduce load by a short-term, specified amount, usually ten minutes.

The “if” also covers the cost of new technology. Homeowners have been somewhat reluctant to purchase higher price CFLs, for example. And the longer lifecycle of many currently-installed appliances does not lend itself to quick upgrades.

Still, realizing that energy costs are on a one-way track upward, homeowners increasingly see value in purchasing or upgrading their appliances in an effort to save money based, in part, on a little bit more investment. And mirroring the successful impact of the Energy Star program, next generation devices that have intelligence and communicate with in-home and utility energy monitoring and management systems can be a “force multiplier.”

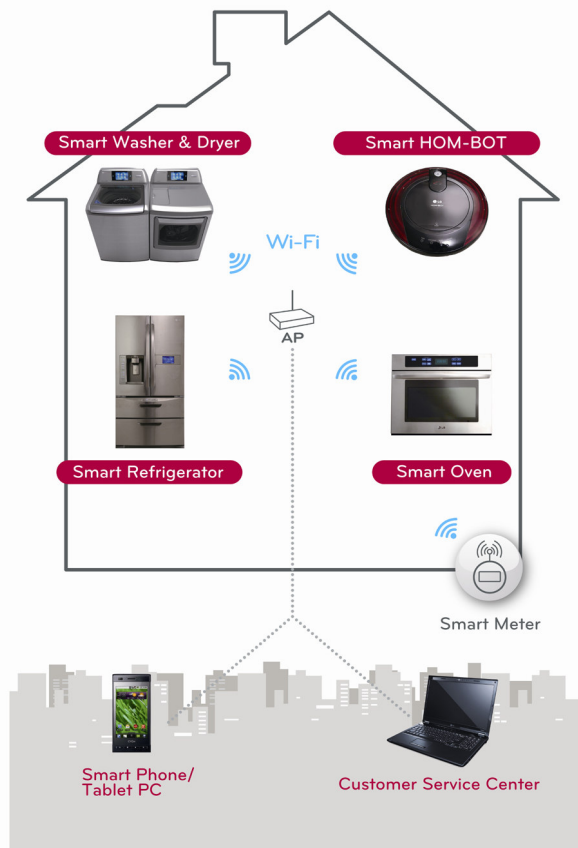
Manufacturers including LG Electronics, Kenmore, Whirlpool and others have connected appliances or plans to introduce appliances that are smart grid-enabled. Check elsewhere in this article for more information on the projects.

What’s happening these days goes back more than two decades but also just a couple of years. Since the late 1970s, for example, energy use per household has gone down. And, more recently, thanks to technology advances ranging from what’s being built into appliances to the overall impact of the smart grid, homeowners now have the ability to accelerate the downward trend of energy costs within their homes.

Consumers are also growing more aware of energy costs and their own ability to manage those costs but there remains an educational effort to make homeowners even more aware.

From Parks Associates, the Dallas-based research firm, its recent Residential Energy Management Survey determined the average expenditures for electricity among U.S. households are over \$170 per month during high-cost periods and over \$75 per month during low-cost periods. Not surprisingly, more than 80 percent of consumers are very interested in learning about ways to cut energy expenditures.

## LG Smart Appliance with THINQ™ Technology



*Smart appliances, coupled with emerging smart grid advances, mean energy cost savings and mobility controls for homeowners. Photo courtesy LG Electronics.*

The study also revealed over one-half of all consumers considers it very important to buy energy efficient or environmentally friendly products. When pressed for their reasons, consumers overwhelmingly point to cost savings over other reasons.

Times have been changing even before the current smart grid, connected appliance movement.



*It's an eco world with appliances providing energy saving and green features. Photo courtesy LG Electronics.*

According to the U.S. Energy Information Administration's most recent residential energy consumption survey (RECS), how homeowners use energy has changed substantially over the past three decades. For example, U.S. homes on average have become larger, have fewer occupants, and are, by the way, more energy efficient. In 2005, energy use per household was 95 million British thermal units (Btu) of energy compared with 138 million Btu per household in 1978, a drop of 31 percent.

The most recent RECS data show that housing units are incorporating more energy efficient features. For example:

More than 44 million households (39 percent) now have an Energy Star refrigerator and 41 million households (36 percent) have purchased an Energy Star clothes washer. Yet entertainment and communication equipment has grown rapidly and makes a difference when it comes to total home energy monitoring and management.

Nearly every home in the United States has a television, and the number and size of televisions and the devices attached to them have been increasing rapidly. In 2009, over 45 million households (40 percent) had a digital video recorder (DVR) attached to the most-used television. The increased popularity of DVRs is significant because they are replacing or supplementing VCRs and DVD players, which consume less energy per unit than DVRs.

Personal computing products also showed an increase in use from the previous 2005 RECS. Over three-fourths of households now have a computer and 39 million homes (35 percent) have at least two computers.

In fact, over the past three decades, the share of residential electricity used by appliances and electronics in U.S. homes has nearly doubled from 17 percent to 31 percent, growing from 1.77 quadrillion Btu (quads) to 3.25 quads. This rise has occurred at the same time that federal energy efficiency standards were enacted on every major appliance; overall, household energy consumption actually decreased from 10.58 quads to 10.55 quads, and energy use per household fell 31 percent.

### **What a Difference Three Decades Make**

No doubt, the economy has been on a rocky road over the previous several years. But in the long-run, the run has been good. While the number of U.S. households grew by 34.5 million from 1978 to 2009, that growth – and the growth of the economy over all those years – has improved living standards resulting in more households buying and using major appliances.

For example, the share of households that have central air conditioning nearly tripled, from 23 percent in 1978 to 61 percent in 2009. Clothes washers increased from 74 percent to 82 percent and dishwashers increased from 35 percent to 59 percent.

It is with electronics that homeowners have gained but, maybe, lost in terms of energy use, especially with personal computers, televisions and related devices.

In 1978, personal computers were expensive and not typically used by U.S. households. In 2009, 76 percent of U.S. homes had at least one computer, eight percentage points more than just four years prior, and 35 percent had multiple computers.

In 1978, most households had only one television. In 2009, the average household had 2.5 televisions. Over 45 percent of homes have at least one television with a screen size of 37 inches or larger. Screen size and average energy consumption per television have continued to grow over time.

## **Talking, Brainy Appliances Plug In**

From Seoul to CES in Las Vegas, encouraged by smart grid advances, home networking and supported in one case with federal grant money, appliance manufacturers are decisively moving beyond touch screens to network- and smart grid-enabled products.

At the Consumer Electronics Show and afterward, for example, LG Electronics now is talking about its first appliances to embrace what that firm calls "the very latest in smart technologies." Starting with smart refrigerators, LG this year will roll out a full spectrum of smart appliances, intelligent and integrated solutions.

"The home appliance industry will in the very near future shift from being mere white goods to high-tech appliances with a range of intelligent functions," says Young-ha Lee, president and CEO of LG Home Appliance Company.

A first look at LG's smart technology – called THINQ – was earlier this year at CES in Las Vegas. The approach comprises smart grid, smart diagnosis, smart access, smart adapt and smart manager, all aimed at letting users manage their refrigerators, washing machines, ovens and robotic vacuum cleaners via a remote network. LG's new smart refrigerator offers updates and information that can be accessed via smartphones and tablets with three savings options: late night saving, preferable time saving and smart grid-ready.

The smart grid-ready option allows for the savings of even more energy once local utility companies begin offering time-of-use pricing systems.

Also at CES in the show's Connected Home TechZone, the Kenmore brand hit such hot buttons as remote diagnostics, touch LCD interface, remote monitoring through iPads and smartphones, and smart grid energy management. The offerings cover to various degrees Kenmore laundry, refrigeration and cooking categories. Kenmore Connect is a new service that allows select washers and dryers to "talk" directly to service teams to answers questions, transmit data and provide product details to properly prepare service technicians should an in-home repair be needed.

Whirlpool Corp. is also on a smart grid track, thanks in part to a U.S. Department of Energy grant

A while back, Whirlpool, with the help of research firm Harris Interactive, surveyed American consumers to gauge habits, practices, needs and demands when it comes to their appliances and their everyday lives at home.

A top finding: 84 percent of consumers said that energy -- not water or time -- is most important to them when it comes to home appliance efficiency. Nearly three quarters (72 percent) of respondents now actively look for the Energy Star label when making purchasing decisions.

When asked what would be a part of a dream kitchen, eco-efficient appliances beat out other items as the top choice. Fifty-three percent believe the refrigerator uses the most energy in the home, followed by the dryer. Forty-four percent of consumers said they did not know if top-load washers use more energy than front-loaders and 38 percent believe that they do, indicating a need for clarity when it comes to communicating the benefits of high efficiency machines to appliance shoppers.

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