Big TVs—Big Energy Bills

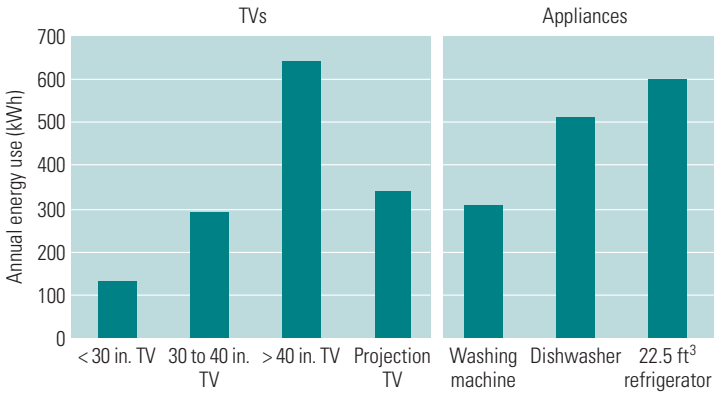
When you buy a new TV, you probably consider things such as picture quality, screen size, reliability, and whether or not a product is capable of providing high-definition service (**Figure 1**). You probably don't think about how much energy that TV is going to use—a recent issue of *Consumer Reports* tested TVs in six different categories and rated three different features but did not mention energy use once. Yet when you bring your set home and get your next monthly energy bill, you might be in for a shock. According to the Natural Resources Defense Council (NRDC), the annual electricity use for TVs is now on a par with that of the biggest household energy hog, the refrigerator (**Figure 2**). But while refrigerator energy use has decreased dramatically over the years, TV energy use is going in the other direction.

Figure 1: Big TVs are big sellers

Source: E SOURCE

Figure 2: TV energy use surpasses that of refrigerators

The larger the TV, the more energy it uses. The largest TVs can use more energy in a year than home appliances such as refrigerators, dishwashers, and washing machines.



Notes: kWh = kilowatt hour; ft^3 = cubic feet.

Source: E SOURCE; data from National Resources Defense Council.

Trends Driving TV Energy Use

Overall, TVs today account for about 4 percent of the energy use in your home. Throw in associated electronics such as cable TV tuners, satellite receivers/tuners, digital converters, and DVD players, and that number rises to about 10 percent. NRDC identified five trends driving TV energy use higher:

1. A growing number of TVs in use and a growing number of TVs per household—a recent estimate cited by the U.S. Environmental Protection Agency (EPA) put the average number per household at 2.8.
2. The purchase of larger TVs—power draw tends to rise with screen size (although this trend does not hold for projection TVs, which can project onto large screens without consuming significantly more power). Electronics consulting firm iSupply of Palo Alto, California, estimated that by

2009 more than 70 percent of TVs in the U.S. will be 30 inches or larger.

3. More use of digital high-definition TVs, which tend to draw more power than analog units.
4. The introduction of new technologies, such as liquid crystal display (LCD) and plasma displays, some of which draw considerably more power than similar-size conventional TVs.
5. The fact that Americans are spending more hours than ever in front of the TV thanks to expanding options such as satellite and cable TV, VCRs and DVDs, TiVo, and video games.

Which TV Technology Is Most Efficient?

There is no clear efficiency leader among different TV technologies. LCDs, which are typically considered the most energy-efficient display technology for computer monitors, don't do as well as the size increases beyond 40 diagonal inches. Earlier test data showed plasma TVs as the biggest energy hogs, but recent measurements indicate that product improvements are narrowing the gap. A recent article that described the most efficient 37.5-inch TVs on the market in Japan listed five LCD and two plasma models. Furthermore, iSupply reported that Matsushita, Hitachi, and Pioneer have jointly developed a prototype plasma display panel that runs on half the power used by current models. A product based on the techniques used in this model approach may be commercially available in the next few years.

Plasma technology also has strong potential for further reductions, according to Larry Weber, one of the original developers of plasma TV technology. That's because the technology that illuminates a plasma screen consists of a million tiny fluorescent lamps, each with an efficacy of about 1 or 2 lumens per watt. We know that larger fluorescent lamps get as much as 100 lumens per watt. Weber says there is no fundamental reason that plasma screens can't get at least 10 or 20 lumens per watt, if not more—time will tell.

How to Choose an Energy-Efficient Model

Unfortunately, there is as yet no standard measure of TV efficiency—no equivalent to the miles-per-gallon rating that you find for cars or the energy consumption estimates that accompany refrigerators or other appliances. There are Energy Star labels for TVs, but they are currently of limited use in estimating annual energy use—the Energy Star label is based on energy consumption when the TV is in the sleep, or standby, mode.

Energy Star. Energy Star is a program run by the EPA and the U.S. Department of Energy to encourage energy efficiency. Energy Star ratings are available for a number of household appliances such as refrigerators, air conditioners, and furnaces. The current criteria for an Energy Star TV focus on the power drawn in sleep mode (**Table 1**, next page)—even when TVs are turned off, they draw a certain amount of power so that they can respond with minimal delay when a user turns the unit on. However, 80 to 95 percent of a TV's energy use occurs when the TV is turned on. By choosing an Energy Star TV, you will use minimal energy when the TV is turned off, but the designation currently says nothing about the total energy a particular TV might use in a given year. The EPA is currently working to update its Energy Star requirements to account for total energy use.

Measuring consumption. One way to estimate TV energy consumption is to use a simple formula:

(Nameplate wattage) × (hours used per day) × (365 days/year)/1,000 = annual consumption in kilowatt-hours

However, that number can be very misleading. One of the challenges in developing new Energy Star criteria is that TV energy consumption varies in different ways,

Table 1: Current Energy Star TV specifications

U.S. Environmental Protection Agency (EPA) Energy Star specifications that went into effect July 1, 2005, require, in most cases, that standby-mode power draw be 1 watt (W) or less.

Equipment	Power draw when unit is switched off
TV	≤ 1 W
VCR	≤ 1 W
TV monitor	≤ 1 W
Component TV unit	≤ 1 W
TV/VCR combination unit	≤ 1 W
TV/DVD/VCR combinations	≤ 1 W
DCR TVs with POD slots[a]	No POD installed: ≤ 3 W; POD installed: ≤ 15 W

Note: a. A removable point of deployment (POD) separates a digital cable-ready (DCR) TV from the cable operator's proprietary conditional access system, which enables portability of the host to other cable networks.

Source: E SOURCE; data from EPA

depending on the technology used. For example, LCDs use a backlight for the entire screen so the power drawn doesn't change with the picture—although the power will change as the brightness setting is varied. With plasma devices, where each pixel is separately energized, power draw changes as the picture changes—so the energy used will vary with the show that you're watching. To deal with all the variations, the NRDC is working with officials from the EPA Energy Star program, the California Energy Commission, and Pacific Gas & Electric Co. to develop new test procedures to measure TV energy consumption. The only nationally recognized test is a decades-old procedure for black-and-white TVs.

Until the new test procedures are finalized and a new Energy Star rating system is available, there is no accurate way to predict how much energy a TV will use. The current Energy Star schedule calls for the new criteria that estimate annual energy use to be in effect in January 2008. Meanwhile, keep in mind that, as a general rule, the bigger the TV and the more you watch it, the more energy it will use.