

## **Atop TV Sets, A Power Drain That Runs Nonstop**

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Those little boxes that usher cable signals and digital recording capacity into televisions have become the single largest electricity drain in many American homes, with some typical home entertainment configurations eating more power than a new refrigerator and even some central air-conditioning systems.

A new study has found that some home entertainment systems eat more energy than refrigerators or central air-conditioning systems.

There are 160 million so-called set-top boxes in the United States, one for every two people, and that number is rising. Many homes now have one or more basic cable boxes as well as add-on DVRs, or digital video recorders, which use 40 percent more power than the set-top box.

One high-definition DVR and one high-definition cable box use an average of 446 kilowatt hours a year, about 10 percent more than a 21-cubic-foot energy-efficient refrigerator, a recent study found.

These set-top boxes are energy hogs mostly because their drives, tuners and other components are generally running full tilt, or nearly so, 24 hours a day, even when not in active use. The recent study, by the Natural Resources Defense Council, concluded that the boxes consumed \$3 billion in electricity per year in the United States — and that 66 percent of that power is wasted when no one is watching and shows are not being recorded. That is more power than the state of Maryland uses over 12 months.

“People in the energy efficiency community worry a lot about these boxes, since they will make it more difficult to lower home energy use,” said John Wilson, a former member of the California Energy Commission who is now with the San Francisco-based Energy Foundation. “Companies say it can’t be done or it’s too expensive. But in my experience, neither one is true. It can be done, and it often doesn’t cost much, if anything.”

The perpetually “powered on” state is largely a function of design and programming choices made by electronics companies and cable and Internet providers, which are related to the way cable networks function in the United States. Fixes exist, but they are not currently being mandated or deployed in the United States, critics say.

Similar devices in some European countries, for example, can automatically go into standby mode when not in use, cutting power drawn by half. They can also go into an optional “deep sleep,” which can reduce energy consumption by about 95 percent compared with when the machine is active.

One British company, Pace, sells such boxes to American providers, who do not take advantage of the reduced energy options because of worries that the lowest energy

states could disrupt service. Cable companies say customers will not tolerate the time it takes to reboot the system once the system has been shut down or put to sleep.

“The issue of having more efficient equipment is of interest to us,” said Justin Venech, a spokesman for Time Warner Cable. But, he added, “when we purchase the equipment, functionality and cost are the primary considerations.”

But energy efficiency experts say that technical fixes could eliminate or minimize the waiting time and inconvenience, some at little expense. Low-energy European systems reboot from deep sleep in one to two minutes.

Alan Meier, a scientist at Lawrence Berkeley National Laboratory, said of the industry in the United States, “I don’t want to use the word ‘lazy,’ but they have had different priorities, and saving energy is not one of them.”

The Environmental Protection Agency has established Energy Star standards for set-top boxes and has plans to tighten them significantly by 2013, said Ann Bailey, director of Energy Star product labeling, in an e-mail. The voluntary seal indicates products that use energy efficiently. But today, there are many boxes on the list of products that meet the Energy Star standard that do not offer an automatic standby or sleep mode.

“If you hit the on/off button it only dims the clock, it doesn’t significantly reduce power use,” said Noah Horowitz, senior scientist at the natural resources council.

Energy efficiency is a function of hardware, software, the cable network and how a customer uses the service, said Robert Turner, an engineer at Pace, which makes set-top boxes that can operate using less power while not in active use.

Sometimes energy efficiency can be vastly improved by remotely adjusting software over a cable, Mr. Turner said. In this way, Pace reduced the energy consumption of some of its older boxes by half.

Cable boxes are not designed to be turned completely off, and even when in deep sleep mode, it takes time to reconnect and “talk” with their cable or satellite network, though that time is highly variable depending on the technology.

Mr. Wilson said he routinely unplugged his set-top boxes at night and waited only 45 seconds for television in the morning. But Dr. Meier said that when he tried to power down his home system at night, it took “hours” to reboot because the provider “downloaded the programming guide in a very inefficient way.”

Cable providers and box manufacturers like Cisco Systems, Samsung and Motorola currently do not feel consumer pressure to improve box efficiency. Customers are generally unaware of the problem — they do not know to blame the unobtrusive little device for the rise in their electricity bills, and do not choose their boxes anyway.

Those devices may cause an increase of as little as a few dollars a month or well over \$10 for a home with many devices. In Europe, electricity rates are often double those in the United States, providing greater financial motivation to conserve.

Cisco Systems, one of the largest makers of set-top boxes, said in an e-mail that they would offer some new models this year that would cut consumption by 25 percent “through reduced power used in ‘on’ and standby states.” There will be no deep sleep or fully “off” setting.

But Cisco said that taking advantage of the potential energy savings for a box would also depend on “how it is operated by the service provider.” Cable and satellite providers will have to decide whether the boxes can automatically go to standby, for example, and whether customers will be able to adjust their own settings. Currently, providers often do system maintenance and download information at night over the cable, so an ever-at-the ready cable box is more convenient for them.

Cable companies can become Energy Star “partners” if they agree to install or upgrade boxes so that 25 percent to 50 percent of the homes they serve have “energy star qualified” equipment. The E.P.A. merely encourages providers to use units that can automatically power down at least partly when not in use.

But as of Sept. 1, typical electricity consumption of Energy Star qualified products would drop to 97 kilowatt hours a year from an average of 138; and then by the middle of 2013, they must drop again to 29 kilowatt hours a year. Companies have fought the placement of the “Energy Star” seal on products and the new ambitious requirements, which may still be modified before enacted.

Mr. Wilson recalled that when he was on the California Energy Commission, he asked box makers why the hard drives were on all the time, using so much power. The answer: “Nobody asked us to use less.”

The biggest challenge in reducing energy use is maintaining the rapid response time now expected of home entertainment systems, Mr. Turner said. “People are used to the idea that computers take some time to boot up,” he said, “but they expect the TV to turn on instantly.”