Energy Star PCs Debut

New Systems Offer Small Improvement Over Pre-Green Products

By Mike Feibus

PCs in the first wave of systems sanctioned by the US Environmental Protection Agency (EPA) as Energy Star-compliant are now available—they were unveiled last month at the White House, no less. But don't expect corporate profits to skyrocket any time soon in the face of lower energy bills.

Despite the fanfare, there's little to differentiate the current wave of so-called green PCs from their pre-Energy Star predecessors. The only perceptible adjustments appear to be minor BIOS changes to enable standby modes, fewer add-in slots—to reduce the size of the power supply—and an Energy Star logo, of course.

It is evident that computer makers by and large did little to cut power consumption with the first round of Energy Star PCs. They didn't cut much because they didn't need to—the EPA currently sanctions PCs as Energy Star if power consumption in a standby mode is less than a fairly comfortable 30 watts. (The 30-W ceiling excludes monitors, which have their own 30-W limit. Unlike systems, however, Energy-Star monitors should produce significant power savings. See sidebar, page 25.)

Some systems shipping today meet the 30-W ceiling when fully active, with no modifications. In fact, most systems shipping without LAN cards, fax/modems, and other peripherals probably consume 30–40 W—about 20–30 W for the motherboard, another 5 W for the hard disk and 5 W for a pair of disk controllers. OEMs could make a design Energy Star-compliant simply by paying extra attention to which off-the-shelf parts they choose.

Despite the modest, albeit highly publicized, start, PCs will get greener in the coming months as power-saving components suitable for the desktop become more widely available. Beyond that, there are some serious obstacles to reaching the EPA's lofty goals of saving $2 billion annually on computer-related energy bills.

To be fair, the EPA is walking a fine line with the Energy Star program in trying to garner support for an energy-saving program from an industry beleaguered by savage price wars. So when it established the Energy Star criteria, the government agency was faced with an unpalatable choice of setting a tough ceiling that risked no industry participation, or ensuring the industry would take part by instituting a ceiling that was high enough so as to require little effort to comply.

Meaningless As "Lite" Bacon

It's not hard to see why the EPA chose the latter route. Its track record for improving the environment by issuing directives to corporate America has been abysmal. With the Energy Star initiative, insiders say, the EPA is taking a different tack. Rather than mandating to industry, the EPA is enticing companies to participate by offering them a marketing gimmick with about as much meaning as a "Lite" label on a package of bacon.

The hope is that widespread proliferation of the Energy Star sticker will spur buyers to demand green, and the EPA can gradually make compliance tougher to achieve. For its part, the federal government is putting its massive procurement weight behind the initiative by restricting PC purchases to Energy Star systems beginning this October.

In the meantime, though, the impact of Energy Star on power consumption is questionable. For this first go-round, the EPA has chosen to target the times that PCs are inactive. The justification is that, according to the EPA, as many as 40 percent of PCs are left on overnight and weekends. Combine that with travel, meetings, and lunch breaks, and the EPA estimates that the average PC is idle more than it is actually working.

With the assumption that PCs are idle an average of three hours during an eight-hour work day, systems that are never turned off are not being used 143 hours out of 168 hours in a week, or about 85 percent of the time. If that's true, then an Energy Star setup—with the system powering down to no more than 30 W from 40 W and the monitor dropping to under 5 W from 65 W—would save 10 to 12 kWH per week, or 500 to 600 kWH per year. Assuming 10 cents per kWH, that results in $50 to $60 savings annually.

A bigger issue on a more macro level is how many machines are being left on because they need to be on. Many machines remain on because they are part of a network or handle fax/modem traffic. If the network interrupt, for example, is what wakes these systems, they will never drop into an idle state without some significant changes in network software. It appears that network-software shops are watching from the sidelines to see whether the Energy Star initiative is more than a fad before tackling that change.

Most of the power savings expected today comes from the monitor, which would be unaffected by network traffic or receiving faxes. For the remaining PCs that do not handle network or fax/modem traffic but are nevertheless left on, instituting an idle mode would save power. Of course, simply turning off these machines—and even monitors attached to networked systems—would save even more power.

Greener Chipsets Due

The Energy Star program launched late last month is spurring a new wave of system-logic chip sets that combines power-management features of notebook designs with performance characteristics typically found in desktop offerings. Most of these chip sets are expected to be shipping this fall in time to make it in systems announced at Fall Comdex.

Several chip sets recently announced—including those from ETEQ Microsystems, OPTi, PicoPower, Silicon Integrated Systems (SiS), VLSI Technology, ACC Micro, and Western Digital—all fit this bill. All should be sampling by the fall and shipping by year's end. By and large, they are all designed to work with various 486 flavors.

SiS is announcing this month its 85C471, which also features an integrated direct-mapped, write-back cache controller. The device also supports system-management mode (SMM). The 208-pin '471 integrates the 82C206 peripheral controller and supports VL-Bus.

ETEQ's CUB ET8000 chip set provides power management as well as a direct-mapped, write-back cache *(see **070502.PDF**)*. Both the ET8000 and the SiS '471 are 5V devices, but both companies plan to introduce 3V implementations late this year or in early 1994.

OPTi offers the 82C801, which supports SMM and integrates a secondary cache controller. It uses a 208-pin PQFP. Soon to follow is the 82C802, which adds support for a write-back cache and the SL-enhanced stop-clock signal.

PicoPower plans a two-chip set, called Redwood, to address Energy Star designs. The chip set includes PicoPower power-management features along with a secondary cache. The chip set, which is packaged in two 160-pin TQFPs, is scheduled to sample in September with production quantities available before year's end.

VLSI Technology this spring announced the VL82C483, which includes a write-back cache controller and VL-Bus support. When used with VLSI's power-management chip, the VL82C003, the '483 supports Intel SMM and standard hardware features necessary for power management.

Western Digital is expected to add a secondary cache controller to its power-management chip set, the WD8110LV *(see **070903.PDF**)* in the near future.

ACC Micro recently announced the 2168gt, a desktop version of its 2046st *(see **070903.PDF**)* that includes a flexible secondary cache controller and power-management for SL-enhanced processors. It uses a 208-pin PQFP.

Most of the chip sets discussed are 5V devices, although most vendors intend to offer mixed-mode support later this year or early 1994, and all-3V support sometime next year.

Legitimate Power-Saving Advances

The EPA targeted power consumption when computers are idle rather than in use because power-management techniques popular in notebook PCs—slowing the clock and powering down the hard disk, for example—frequently have a perceptible drag on overall performance. Notebook PC users accept this performance degradation because lengthening battery life is at least as important to them as system speed. For desktop users, however, those annoying delays—such as waiting for the hard disk to power up to cut and paste, for example—are intolerable. PC manufacturers would be largely unwilling to implement them while the system is in use, and the EPA would have risked mass defection from its program if it had required their implementation.

It is acceptable, however, to shut down peripherals and slow the clock when a desktop machine is idle, because there's no degradation in performance. In practice, though, few of the Energy Star PCs introduced late last month used system-logic chip sets targeted at the notebook market, even though those chips offer such power-management features. Designers we interviewed cited the higher cost of these chipsets and lack of secondary cache control as the primary reasons for steering clear of notebook chip sets for their initial Energy Star systems.

As mentioned, most of the early Energy Star PCs limit expansion slots, primarily to compensate for power supply efficiency. Power supplies don't currently operate at ranges wide enough to allow for Energy-Star compliance. Power supplies rated at 200 W, for example, generally won't operate below 30 W. By limiting expansion slots, OEMs can use power supplies rated closer to 100 W, which will work with loads under 30 W. Fewer expansion slots also allows the vendor to reduce the size of the case.

IBM's "green machine," the PS/2 E, features four PCMCIA slots for expansion. Most others offer three or four ISA slots. ALR's Flyer VL Green PCs includes three AT expansion slots and a VL-Bus slot.

What's In Store

PCs are expected to get greener—up to a point. By Fall Comdex, many Energy Star PCs will take advantage of several new semiconductor developments, including:

- Desktop chip sets that combine power management features found in notebook offerings with desktop performance features such as secondary cache control (see "Greener Chipsets" sidebar).
- Static, 3V 486 processors from AMD, Cyrix, and Intel that feature a System Management Mode *(see **070801.PDF** and **070704.PDF**)*.
- More highly integrated peripheral chips with desktop performance and support for VESA's display power-management signaling (DPMS), such as Cirrus Logic's Alpine graphics accelerator *(see **070901.PDF**)*.

Green Screens and Printers

The CPU isn't the only desktop device targeted by the Energy Star program; monitors and most printers also are are subject to the same 30-W ceiling as PCs. One way for OEMs to get their monitors to meet the Energy Star guidelines is with display power-management signaling (DPMS), a standard introduced last month by the Video Electronics Standards Association (VESA) that is designed to allow PCs to control the power consumption of monitors. DPMS-ready monitors were first unveiled at PC Expo late last month and are expected to begin shipping in production volumes this fall.

Graphics controllers and BIOS suppliers also are hopping onto the DPMS bandwagon. Even Berkeley Systems, which supplies the popular After Dark screen saver, is bundling a DPMS utility to power down DPMS-compliant monitors. Berkeley Systems is trying to capitalize on DPMS, although the Energy Star initiative arguably threatens it more than any other company, since the appeal of screen savers drops tremendously once screens routinely fade to black after a few minutes of inactivity.

A graphics controller that supports DPMS can make the horizontal and vertical sync signals of the video interface quiescent and can assert different polarities on each signal. These manipulations allow the display controller to signal four different states to the monitor. For example, if the PC is idle for some time, instead of engaging an animated screen-saving display, the CPU can direct the controller to assert a DPMS "sleep" signal, putting a DPMS-compliant monitor into a power-saving mode such as sleep, which turns off the picture tube.

These modes reduce the power consumption of a typical monitor below 30 W in its low-power modes. Typical 14-inch monitors demand about 60 W in ready mode; 15-inch monitors consume about 70 W full on; and 17-inch monitors use about 80 W. All consume less than 3 W when the system is in the off mode. Even in standby mode, when horizontal sync is static but the vertical is active, monitors typically consume about 20 W—significantly less than the 30 W mandated for Energy Star compliance.

Until DPMS monitors are widely available, Nanao USA offers a unique series of power-down monitors. These monitors are being bundled with many of the first round of Energy Star PCs. With some basic intelligence—timing, control and sensing—built in, they are designed to begin their idle process three minutes after the PC's screen saver program is activated. The monitors watch for the absence of blue-gun activity in the CRT. Using Nanao's 17-inch version as an example, it idles down to about 12 W in its first power-saving stage and about 8 W in the second stage. It takes as long to reactivate the monitor from the second stage as it does to bring up a cold monitor.

DPMS is expected to take over the monitor power savings in Energy Star-marked PCs in the not-too-distant future. One reason is that DPMS doesn't materially affect the monitor manufacturing cost—or the graphics-controller cost—while Nanao's monitors adds several dollars in components to the monitor. Another reason is that Nanao's monitors only work with screen-saver software that does not use blue; DPMS doesn't need to rely on screen savers to begin its countdown to power-saving modes.

IBM's PS/2 E, the company's green PC, ships either with a 10-inch, active-matrix flat-panel display or a more traditional, 14-inch color CRT. Although the flat-panel display is clearly appealing for its lower power consumption, it may not become a popular option due to its higher cost, lower performance, and lack of resolution options.

Printers represent the lone category with dual standards for earning the Energy Star seal. Heavy-duty network laser printers—defined as those that can churn out at least 15 pages per minute—are allowed to use up to 45 W, while lower-performing laser printers and other types of printers (such as inkjet and thermal) are limited to 30 W.

What happens after this is anyone's guess, although there are a few likely scenarios. One, the most pessimistic, is that Energy Star becomes nothing more than a checklist item like a secondary cache or dual floppy drives are today. Alternately, PC manufacturers might try to differentiate by outgreening their competitors, advertising 15-W power consumption in standby mode, for example.

Conclusion

The first PCs sporting the EPA's trademarked Energy Star logo have a fair chance of selling well, if for no other reason than President Clinton has mandated that the US government will buy them. In and of themselves, though, these machines will contribute little to energy conservation—unless there are many more non-networked PCs left continuously on than we can imagine.

The EPA understands that it will take years of compromise if the Energy Star program is to have a significant impact on computer energy demands. It would be ludicrous in today's fiercely competitive climate to expect PC manufacturers to add substantive power savings features—or any features, for that matter—if they add to the price of the system. The EPA was wise enough not to demand this.

Instead, the agency is hoping to proliferate the Energy Star seal and—more importantly—to generate end-user demand for green PCs. The EPA is already working on tougher specifications for a "Super Star" label. Only over time—when green-ness becomes as important a purchasing criterion as the speed of the graphics accelerator or the size of the secondary cache—will power savings from energy-efficient PCs amount to even a blip on the national energy bill. ♦

