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Saving Electricity



Mr. Electricity is your guide to saving energy in your home.



Saving Electricity 101:

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Rebates & Tax Credits

for U.S. consumers

Incentives for installing insulation and for buying energy-efficient appliances like refrigerators, washing machines, and air conditioners are often available from local and state governments and utilities. You can see what's available at [DSIRE](#), [Energy.gov](#), and [Energy Star](#).

Welcome students from:

* [South Adams M.S.](#) (Berne, IN)

Related sites:

[Home Power Magazine](#). All about renewable energy for the home.

How much electricity do computers use?

A typical desktop computer uses about 65 to 250 watts. To find the figure for your particular computer you can contact the manufacturer (not me), or see my section on [measuring electrical use](#).

Add another 20-40 watts for an LCD monitor, or about 80 watts if you have an old-school 17" CRT. And don't forget related devices. My cable modem uses 7 watts, my D-Link DI-604 router uses 4.5 watts, and my Motorola phone box for use with Vonage uses 2 watts while idle (3 when I'm on the phone).

Most laptop computers use about 15-60 watts, far less than desktops.

With most devices you can look at the label to see how much energy they use, but that doesn't work so well with computers because the label gives the theoretical maximum, not the *typical* amount used. A computer whose label or power supply says 300 watts might only use about 70 watts when it's actually running, and only 100 even in peak times with serious number-crunching and all the drives spinning.

As long as your computer goes into sleep/standby when you're not using it, your computer doesn't use squat for electricity, compared to the rest of your household. You'll save a lot more energy by addressing your [heating](#), [cooling](#), and [lighting](#) use rather than obsessing over your computer. For most people, their computers' energy use is not a significant portion of their total use, even if they use their computers a lot. Of course, you should absolutely make sure your computer is set to sleep automatically when you're not using it, because it's silly to waste energy, but your computer likely isn't even close to being the biggest energy-waster in your home. (See [more about sleep/standby](#).) **If you take one thing from this page, it's that you should set your computer to auto-sleep after 15 minutes or so of inactivity.**

Computers

Desktop Computer	60-250 watts
With screen saver running	60-250 watts (no difference)
On Sleep / standby	1 -6 watts
Laptop Computer	15-45 watts

Monitors

17-19" LCD	19-40 watts
20-24" LCD	17-72 watts
17-19" CRT (old kind)	56-100 watts
Apple MS 17" CRT, mostly white (blank IE window)	63 watts
Apple MS 17" CRT, mostly black (black Windows desktop with just a few icons)	54 watts
Screen saver (any image on screen)	same as above (no difference)
Sleeping monitor (dark screen)	0-15 watts
Monitor turned off at switch	0-10 watts

Apple iMac

Most models	~100w
iMac G5 w/multi-in 20" screen...	(see below)
Doing nothing	97 watts
Monitor dimmed	84 watts
Monitor sleep	62 watts
Copying files	110 watts
Watching a DVD	110 watts
Opening a bunch of pictures	120 watts
Computer sleep	3.5 watts

MacBook Pro 2.5GHz Intel Core 2 Duo

Various apps open	30 watts
Playing H.264 video	35 watts
Importing a CD	38 watts
Playing video while importing CD	43 watts
Converting video	64 watts

EeePC 1000H netbook

Calculating chess, screen off	12 watts
Calculating chess, screen on	17 watts

LCD wattage from manufacturers' specs and [CNET](#), 2012. As always, figures are *examples*. See [how to misquote this website](#).

[No-Impact Man](#). Blog about a family striving to have no *net* impact. (i.e., What little they use, they offset.) Inspirational.

[Off-Grid](#). News and resources about living without being connected to a utility company.

Mr. Electricity in the news:

"Michael Bluejay runs the outstanding Saving Electricity site that I've mentioned many times before." --J.D. Roth, [Get Rich Slowly](#)

[How much does your PC cost in electricity?](#), *PC Mech*, Nov 21, 2013
[Can my bicycle power my toaster?](#), *Grist*, June 10, 2013
[Six summer debt traps and how to avoid them](#), *Main St*, June 5, 2013
[To convert to gas or electric?](#), *Marketplace Radio (NPR)*, July 20, 2012
[8 Simple Ways to Reduce Household Waste](#), *Living Green Magazine*, June 29, 2012
[Why is my electric bill so high?](#), *New York Daily News*, Mar. 27, 2012
[Fight the Power](#), *CTV* (Canada's largest private broadcaster), Mar. 23, 2012
[How to Cut Your Electric Bill](#), *Business Insider*, Mar. 20, 2012
[Tips to save energy when using your computer](#), *WPLG Channel 10 (Miami, FL)*, Feb. 23, 2012
[How long will it take an energy-efficient washer/dryer to pay for itself?](#), *Christian Science Monitor*, Oct. 29, 2011
[10 Easy Ways to Lower Your Electric Bill](#), *Forbes*, August 23, 2011
[18 ways to save on utility bills](#), *AARP*, July 9, 2011
[Hot over the energy bill? Turn off the A/C, just chill](#), *Chicago Tribune*, June 24, 2011
[Cool Site of the Day](#), *Kim Komando* (syndicated radio host), May 29, 2011
[This calculator shows how much you spend washing clothes](#), *Lifehacker*, May 6, 2011
[What you pay when you're away](#), *WCPO Channel 9* (Cincinnati), May 5, 2011
[Spotting energy gluttons in your home](#), *Chicago Tribune (CA)*, Apr. 7, 2011
[Walnut Creek author has tips for living a thrifty life](#), *Contra Costa Times (CA)*, Jan. 24, 2011
[Do space heaters save money and energy?](#), *Mother Jones*, Jan. 10, 2011
[Energy steps to take for a less pricey winter](#), *Reuters*, Nov. 10, 2010
[Should you shut down your computer or put it to sleep?](#), *Mother Jones*, Nov. 1, 2010
[Energy saving tips for fall](#), *Chicago Tribune & Seattle Times* Nov. 7, 2010
[10 ways to save money on your utility bill](#), *Yahoo! Finance*, Oct. 2, 2010
[The case against long-distance relationships](#), *Slate*, Sep. 3, 2010
[10 household items that are bleeding you dry](#), *Times Daily (Florence, AL)*, July 27, 2010
[Cold, hard cash](#), *Kansas City Star*, June 22, 10

Government Solar Rebates

Yes, Rebates Are Still Available! Get 3 Free, No Obligation Quotes.



How much it costs to run your computer

To calculate your costs use this formula:

$$\frac{\text{Watts} \times \text{Hours Used}}{1000} \times \text{Cost per kilowatt-hour} = \text{Total Cost}$$

For example, let's say you have a big high-end computer with a gaming-level graphics card and an old CRT monitor, and you leave them on 24/7. That's about 200 watts x 24 hours x 365 days/yr = 1,752,000 watt-hours, or 1752 kilowatt-hours. If you're paying \$0.36 per kWh, **you're paying \$631 a year to run your computer.** (In California, PG&E's highest tier is \$0.33/kWh, and the average in Hawaii is \$0.36/kWh. [source](#))

Let's try a different example: You have a computer that's less of an energy hog, like in iMac G5 20", which uses about 105 watts, and you're smart enough to turn it off or sleep it when you're not using it. You use it for two hours a day, five days a week. That's 105 watts x 10 hours/week x 52 weeks/year = 54,600 watt-hours, or 54.6 kWh. If you're paying 10¢ per kilowatt-hour, then **you're paying about \$5.50 a year to run your computer.**

That's quite a range, \$5.50 to \$631 a year. It really depends on what kind of computer it is, how much you use it, and your local rate for electricity -- and *especially* whether you turn off the computer when you're not using it (or at least [sleep](#) it). Both the examples above are extremes. I used to have only one example somewhere in the middle but then I'd see people on blogs and forums [misquoting](#) it by writing, "Mr. Electricity says a computer costs about about \$150/yr. to run." No, that is *not* what I said. I said that was *just an example*. Your situation is almost certainly different, and you need to consider all the variables listed in the first sentence of this paragraph.

Factors that affect energy use

More Energy	Less Energy
Ready to be used	Sleep / Standby
Desktop	Laptop
Faster processor	Slower processor
PC	Mac
Heavy use (all drives spinning, processor-intensive task)	Light use (e.g., email, word processing)
On the Internet	Offline

Sleep & Screensavers

Modern computers automatically go to "sleep" when you haven't used them for a while, drawing only 0-6 watts. (Putting the computer to sleep also sleeps the monitor, on most models.) In the past, turning on the sleep setting was the most important way to save on computer energy use, but now that the sleep option is turned on by default out of the box, that's pretty much done for you. Just make sure you don't override it by turning it *off*. Of course, you can go the other direction, tweaking your sleep and power usage settings, especially by having your computer sleep sooner after a period of non-use. Here's where to set your options:

- In **Windows 7** or **Vista** go to **Start > Control Panel > Power Options** (here's a [how-to-article](#), an article about [power-saving changes in Windows 7](#), and [default settings in Vista](#))
- On a **Mac** go to **System Preferences > Energy Saver**

There are various flavors of sleep, including Sleep, Standby, and Hibernate. It's not terribly important to understand the difference between them. In a nutshell, hibernate saves your workspace (all the open windows) and then turns your computer *off*, so it saves

- [Stretch your dollar, not your budget](#), *Globe and Mail*, May 18, 2010
- [Auto abstinence](#), *onearth magazine*, Winter 2010
- [2010 Frugal Living Guide](#), *Bankrate.com*
- [Energy-saving schemes yield €5.8m in savings](#), *Times of Malta*, Dec. 20, 09
- [Four ways to reduce your PC's carbon footprint](#), *CNET*, Dec 2, 09
- [The day I hit the brakes](#), *onearth magazine*, Fall 2009
- [Enjoy the mild weather, low electricity bills](#), *Detroit Free Press*, Jul 18, 09
- [The most energy-efficient way to heat a cup of water](#), *Christian Science Monitor*, Jun 16, 09
- [Ten ways to save energy](#), *Times of Malta*, Jan 3, 09
- [Measuring your green IT baseline](#), *InfoWorld*, Sep 4, 08
- [The Power Hungry Digital Lifestyle](#), *PC Magazine*, Sep 4, 07
- [Net Interest](#), *Newsweek*, Feb 12, 07
- [Going Green](#), *Monsters and Critics*, Jan 6, 2007
- [A hunt for energy hogs](#), *Wall Street Journal Online*, Dec 18 06

If you like this site, you might also like some of my other sites:



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more energy than standby, but a hibernating computer takes longer to wake up. For the curious I have a separate article about [the differences between Sleep, Standby, and Hibernate](#).

A screensaver that shows any image on the screen doesn't save any energy at all, on either the monitor or the computer. You save energy only if the monitor goes dark by going to sleep.

Granola power saver

A Windows/Linux app called Granola constantly optimizes your computer's processor speed to save electricity. They claim savings of 10-35% without sacrificing performance, and laptop users will get more battery life off a single charge. Granola is free for individual users, and \$8 per machine for business users. It's not available for Macs. Note that Granola isn't a substitute for sleeping your computer, it's a *complement* to sleep. If you had to choose one or the other, you'd definitely save more by having your computer auto-sleep rather than using Granola. But you don't have to choose one or the other, you can do both.

My recommendations

- **Set the Power settings on your computer to automatically go into Sleep/Standby mode** after 15 minutes or so of inactivity.
- **Use a laptop computer.** They use lots less energy than desktops.
- **If you use a desktop, use an LCD monitor.** They use lots less energy than CRT's.
- **Turn your computer off when you're done for the day.**
- **Use a Mac, or use the Granola power saver for Windows/Linux.** Macs have generally used less electricity than most PC's. (I haven't had a chance to test current models, but I don't expect that a lot has changed.)
- **Use a power strip** so you can easily turn off all your computer accessories at once. BITS makes a [special power strip](#) that goes one step further, automatically cutting power to peripherals when you turn your computer off.

Specific Models

Here are some figures for some specific models. Don't write to me to ask me how much your particular computer uses, because I didn't make your computer and unlike you, I don't have access to it. Contact the manufacturer or buy a [watt-hour meter](#).

Desktops	Maximum	Minimum	Sleep	Off
Dimension B110 (Pentium 4 520)	112	60	3.0	1.7
Optiplex GX620 (Pentium 4 630)	127	72	1.3	2.5
Dimension E310 (Pentium 4, 2.8GHz)	132	71	1.7	1.7
Optiplex 170L (Pentium 4, 3.2GHz)	163	80	3.7	2.2
Dimension E510 (Pentium 4 551)	165	106	1.3	0.7
Dimension XPS 600	200	142	5.5	4.5
Dimension XPS 400 (Pentium 4 551)	258	149	2.0	1.0

Apple iMac G5 w/built in 20" LCD screen	
Doing nothing	97 watts
Monitor dimmed	84 watts
Monitor sleep	62 watts
Copying files	110 watts
Watching a DVD	110 watts
Opening a bunch of pictures	120 watts
Computer sleep	3.5 watts

Yes, it doesn't make sense that the Dell GX620 is listed as using more power when it's off than when it's sleeping, but I'm just reprinting the numbers from Dell's specs.

Ben Folds Five

The rise and breakup of the world's greatest piano pop band.

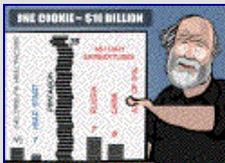
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Step-by-step guide for first-time homebuyers.

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The Military Budget as Cookies

This excellent animation from TrueMajority shows in graphic detail (using Oreo cookies) how ridiculously, large the military budget is, and how we could solve many domestic problems with a modest 12% cut. A must-see. [\(watch it now\)](#)



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I'll cry if you don't link to me.

[MichaelBluejay.com](http://michaelbluejay.com)

Dell Pentium 4's from Dell's website. iMac G5 from my own measurements (except the max, which is Apple's spec).

The University of Pennsylvania has a somewhat [more recent list of Mac / PC wattage](#).

You won't wear your computer out by turning it off

You won't wear your computer out any faster by cycling it once a day, or even a few times a day. Modern computers just aren't that fragile. I did hardware troubleshooting at Apple, by the way. If you don't believe me, maybe you'll believe Jonathan Koomey, a project scientist at the Lawrence Berkeley National Laboratory, who says, "PCs are not hurt by turning them on and off a few times a day." ([Wall St. Journal](#))

The useful life of a computer these days is only a few years anyway. The computer will become obsolete long before you wear it out, no matter how often you cycle it. **Bottom line: Turn your computer off when you're done with it (or simply Sleep it), and don't worry about it.** ([more on this topic...](#))

It also doesn't take more energy to start a computer than to keep it running. The only extra energy it takes to start a computer is the two minutes or so it takes to start up, which is barely different than any other two minutes' of use. *You'll always save energy by turning your computer off when you're not using it.* Of course you don't have to turn it off since you can easily use the sleep or standby mode instead.

The myth of "turning it off uses more energy than keeping it on all the time" exists for just about every device that exists, and **it's wrong in every single case**, in practical terms. (Meaning, you will never, ever, ever see any savings on your electrical bill by keeping something on all the time vs. turning it off. Period.) You will **always** save electricity by turning your device off when you're not using it (or sleeping it, if it's a computer).

Whether to use a laptop to save energy

Some people think it's a bad idea to replace desktops with laptops even though they use less energy, because they're more likely to require repair, those repairs are more expensive than desktop repairs, many users thus choose to replace their broken laptop rather than getting it fixed, and laptops require disposal of chemically-laden batteries when they wear out. While these things are true, I think the average person (and the environment) will still come out ahead over all by using a laptop over a desktop, because only a fraction of laptops will actually break and get replaced. If every laptop failed like this during its life (or even if most of them did), we could easily say that it would be better to stick with desktops. But since only a fraction of laptops fail, I still think there's a net savings by using laptops.

Energy-Efficient PC's

In June 2007 the EPA started giving an "Energy Star" rating to energy-efficient computers. While this is important, *sleeping your computer when you're not using it is more important.* An inefficient computer that sleeps when you're not using it uses far less energy than an Energy Star computer you keep running 24/7. This is so important I'm going to repeat it: **Making sure you sleep your computer when you're not using it is way more important than what kind of computer you use.**

Computer power supplies are only 55-80% efficient. That means with a cheap power supply, nearly half the energy consumed is wasted. At least 80% efficient power supplies are required to get the EPA Energy Star label, but even then up to 20% of the energy consumed is wasted. ([Tom's Hardware](#))

There are a handful of ultra-low-energy PC's available. They all come with some flavor of Linux instead of Windows, and typically come with Firefox for web browsing and Open Office for productivity. The low-power processors they use also mean that they're a bit slow. (e.g., The Linutop 2's AMD LX processor runs at 500 Mhz.)

- [Zonbu](#). Their \$300 Mini desktop uses only 15 watts.
- [Linutop](#). Makes tiny PC's that use only 5 to 8 watts, for around \$400.
- [Everex gPC](#). Claims to use only 2 watts on average but I'm skeptical because their website is short on details.

Energy required to make a computer

[This paper](#) said it took about **6400 megajoules of electricity to make a desktop computer and a 17" CRT monitor in 2000**, which would be about **1778 kwh** -- or as much electricity as the typical household uses in two months. Yet another reason to buy used. I've purchased my computers on [eBay](#) since 1998.

The Internet and Electricity

The Internet doesn't use as much electricity as you might think.

Computers account for only a fraction of worldwide electrical use, even with the burgeoning Internet. Air conditioning, lighting, and refrigeration account for a *lot* more. In fact, as inefficient CRT monitors are being phased out in favor of newer LCD screens, and as more people replace their desktop with laptops, computer energy use isn't likely to rise very much in the coming years.

The site UClue gives an outrageous estimate for the Internet's use of electricity, clocking it at 9.4% of all electricity used in the U.S. The first problem is that they count *individual users' computers*, even though those computers don't power the net. And even though those computers do *use* the net, their owners aren't surfing for 100% of the time the computer is on. Further, even if there were no Internet, office employees would still use computers all day (like they did before the Internet). And for home users, if someone's not on the Internet, they're probably watching TV, [which uses even more energy](#). So personal Internet use isn't "new" energy being used. Finally, I think UClue is overestimating the amount of energy used by end users' computers in the first place. (And their link to their source for that figure is dead.) So taking personal PC's out of the picture and looking only at the energy to run the datacenters (including the costs to cool them), UClue's figure drops to only **1.2%**.

We should also consider how much energy the Internet saves us. For starters, take a look at this website; thousands of people have used it to learn how to reduce their consumption. That's nothing to sneeze at. And online shopping means you can buy stuff from your home without driving somewhere, meaning more energy savings. Online maps let us find our destinations easier with less driving, too. Then there's the fact that email lets us send messages and documents without requiring a fossil-fuel vehicle to physically deliver the hardcopy. So the Internet's share of energy use should be certainly be contrasted with the amount of energy it *saves*.

Now let's talk about the electricity to power websites. If you had to have a separate computer to host each website, then we'd have a big energy problem, but fortunately that's not how it works. A single computer (server) can host hundreds or even thousands of websites. In fact, that's what made websites affordable to the masses in the late 90's. If you had to rent the whole computer from your host then the cost would be astronomical. But your site is on the same server with lots of other folks' sites, which is why they call it *shared hosting*. By contrast, *dedicated hosting* is when you rent an entire server for yourself. But even then, you can put dozens or hundreds of sites on your server, as I've done with mine. And for my server, I [chose a host](#) that purchases [carbon offsets](#) to offset the pollution caused by generating the electric to run the server, which is why you see the "This site is green" logo on the bottom of the page. Also, in October 2008, they announced they were spending \$1 million to upgrade their old servers and cut their energy costs in half.

The very largest sites (Google, Yahoo, eBay) require multiple servers just to run their one site. But those sites are used by millions of people every day. The energy use on a per-person basis isn't that great. Also, the largest companies have been taking bold steps to reduce their energy footprint. For example, in 2007 Google built a massive 1.6-megawatt solar system at its headquarters in California. It generates 30% of Google's peak demand, and around *two million kWh a year*. It's the largest corporate solar install in the U.S. (There are larger installations at utility companies, but this is the biggest for a company generating its own electric.) Google has a page where you can [see how much electricity they generated](#) in the last 24 hours and the last 7 days. You can also see a [flyover video of their installation](#). The system will take 7 years to pay for itself, and then will generate free electricity for another 18. (The lifespan of the panels is about 25 years.) It doesn't end with this huge installation. In late 2007 Google [announced its plans](#) to develop a whopping **one gigawatt of energy from renewable sources** at a cost cheaper than coal, and to do it "within years, not decades". Wow!

Yahoo is also addressing its energy footprint. Besides Yahoo [cutting the carbon footprint of its data centers by 40%](#), they have a very progressive [Commute Alternatives Program](#) to encourage employees to not drive to work alone. It includes things like shuttles to transit stations, transit discounts, a carpool matching service, preferred parking for carpoolers, bike racks/lockers/showers, and free lunches, massages, and movie tickets to employees who participate in the program.

In short, there's no need to scapegoat the Internet for electrical use -- especially when things like cooling, heating, lighting, and refrigeration use so much more. And this site will give you lots of ammunition for how to use less.

Questions & Answers

[See questions I've received and answered](#) about how much energy computers use. Please note that I'm not accepting any more questions for this website, period.

Last update: March 2012

<p>Saving Electricity 101: Start Here How much it costs / how they charge What's a Watt / Kilowatt? How much energy stuff uses How to measure electrical use</p>  <p>Mr. Electricity is your guide to saving energy in your home.</p>	<p>General Electricity Myths Using elec. when off? Why is my bill so high? Capacity of an Outlet Electric Meters General Questions</p> <p>Specific Appliances Cooling Heating Lighting Refrigerators Washing Machines Clothes Dryers Water Heaters Computers Televisions Cooking Elevators</p>	<p>Environment Carbon footprint calculator Carbon offsets Solar Power Bicycle Power Alternative Energy Climate change</p> <p>Special Topics Standby power Compact Fluorescents/CFL Surge Suppressors (TVSS) Power Factor Commercial Buildings Using devices overseas</p>
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