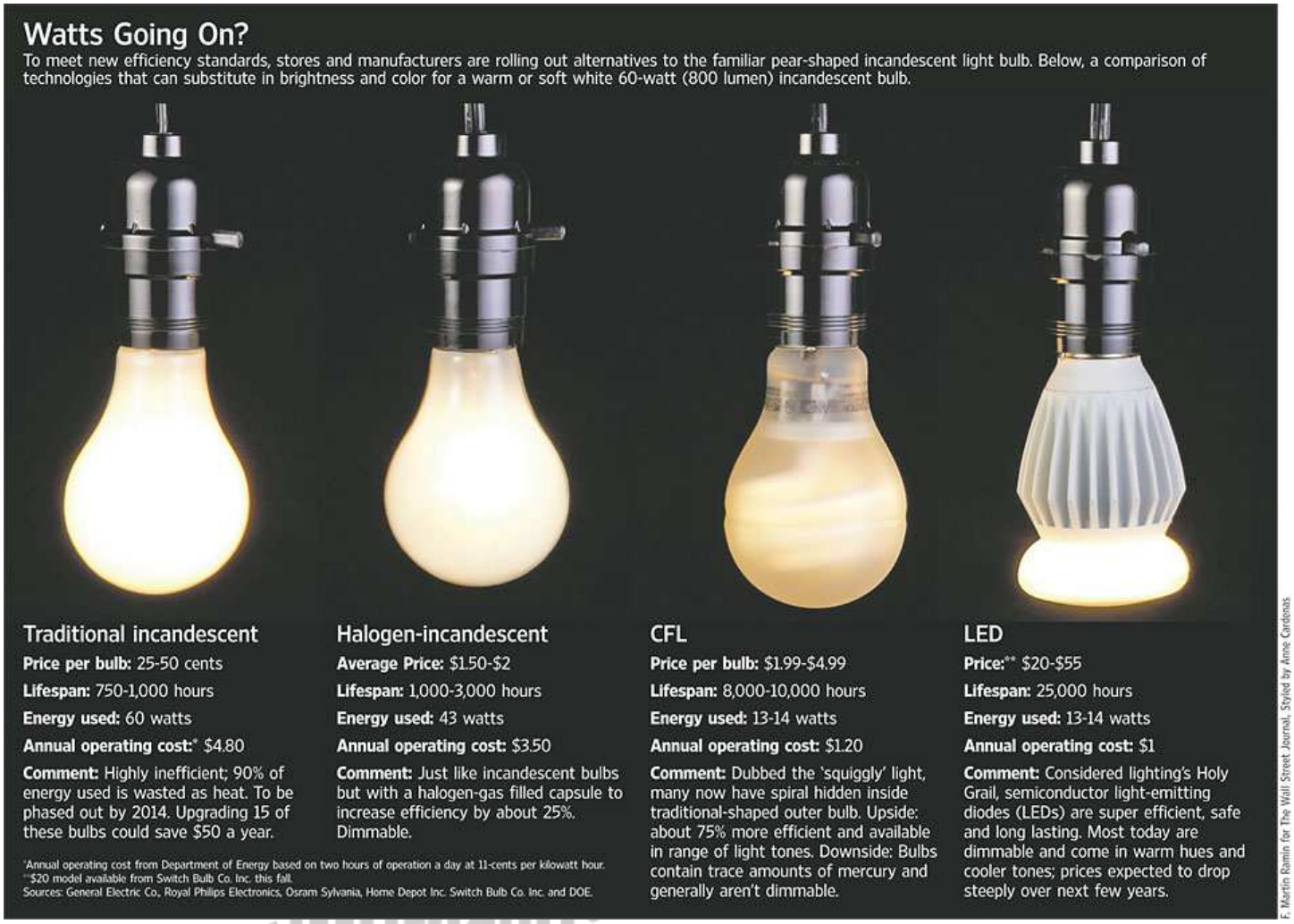
Energy Usage Estimation

With today's economy everyone wants to save energy and ultimately energy costs, especially if you are on-the-grid. If you plan to go off-the-grid, this is vital information to collect for the planning and budgeting phases of selecting your off-grid systems.

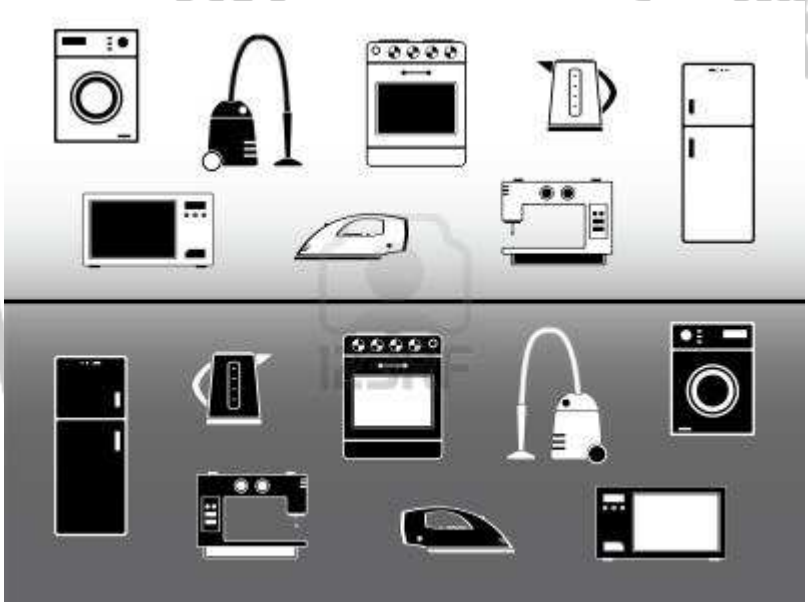
You will need to know just what kind of electrical energy usage you want to have, would like to have and can't do without. To do this you need to know what the electrical usage is to all of your everyday appliances, devices and products. You also need to know what, if any, standby or Vampire power usage is associated to each item and compare that to what electrical energy you will have available or can afford.



On top of this in December 2007 Congress signed into law to phases out the 125-year-old bulb in the next four to 12 years in favor of a new generation of energy-efficient lights that will cost consumers more but should return their investment in a few months. In 2012 the "phase out" begins in earnest. (Read more information at: http://www.usnews.com/money/business-economy/articles/2007/12/19/faq-the-end-of-the-light-bulb-as-we-know-it.html) Due to the mercury content of compact fluorescent (CFL) bulbs there has been a delay (thank goodness) on the cessation of production of incandescent bulbs.

Math has never been my forte and I prefer the simple, “just give me a chart” or table style of things. But I do have times when I just want to know all the nitty-gritty of something and I know some professionals that won’t read anything that isn’t detailed or somewhat technical. This document will contain a little of both. To all you professionals out there, please note that I am NOT an electrician or professional so my “technical stuff” will be from a lay person’s viewpoint.

There are all kinds of items and appliances that utilize some form of energy, from computers to refrigerators and freezers to our vehicles, heating and cooling units, to our stoves, radios, lights and power tools. Whatever you will be using as your energy sources (yes plural, always have more than one for at least some items), this should help you determine your current usage and provide a few tips to help you save on energy use without sacrificing too, too much.



The Mathematical formula for Appliance and Electrical Device Usage Estimates:

(Wattage × Hours Used Per Day ÷ 1000 = Daily Kilowatt-hour (kWh) consumption

(1 kilowatt (kW) = 1,000 Watts)

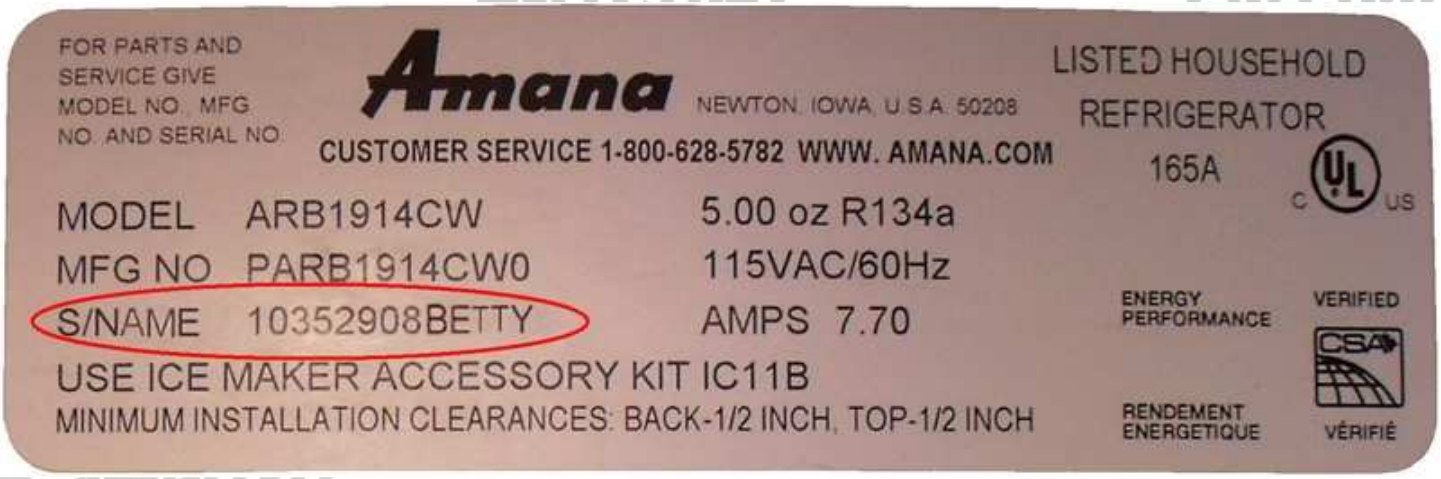
Multiply this by the number of days you use the appliance during the year for the annual consumption. You can then calculate the annual cost to run an appliance by multiplying the kWh per year by your local utility's rate per kWh consumed. Provided your existing electrical provider is not changing their rates every other month.

Note: To estimate the number of hours that a refrigerator actually operates at its maximum wattage, divide the total time the refrigerator is plugged in by three. Refrigerators, although turned "on" all the time, actually cycle on and off (i.e.: the compressor goes on and off) as needed to maintain interior temperatures.

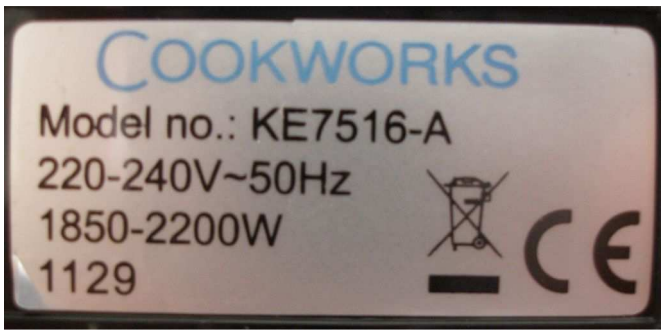
You can get the wattage of a product by looking at the label of the product in question. Nearly everything you can plug into the wall has a label that says how much electricity it uses. (It may be printed directly into the plastic or metal.) You may have to hunt for the label. It's often located on the bottom or side of the device, or possibly where the power cord enters the unit. If the device is powered with an AC/DC adapter, the electrical rating is usually listed on the adapter itself.

If the label only gives the number of *amps* and not the number of *watts*, then just multiply the amps by 120 to get the number of watts. (Amps x Volts = Watts, and most U.S. electricity is 120 volts. So a hot plate that uses 6 amps uses 6 x 120 = 720 watts. (Most other countries use 240 volts instead of 120, so outside of North America and Japan use 240 instead of 120 in your calculations.)

If a device is powered by a transformer (one of those great big boxy plugs), then the transformer has converted the electricity from AC to DC, so you need to multiply by the DC voltage, not the AC voltage of 120. For example, if the device says "INPUT 9V, 0.5A", then that's 9 volts x 0.5 amps = 4.5 watts.



Some appliances may be labeled 110, 115, or 120 volts. Appliances are actually designed to accept a range of voltages, between 110-120 volts and the exact voltage coming out of your electrical socket can vary depending on conditions at the power plant, in your own home or homestead's "power plant". So when this document refers to 120 volts, let's understand that it's actually a range from 110-120 and just use 120 for your calculations (unless you're outside of North America or Japan, in which case you probably have 240 volts).



Some devices might actually list a huge voltage range, like 100-240V. That just means that it will work with any country's voltage. For your calculations, use the voltage for the country where you're plugging the device in.

Watts and Wattage; Amps and Amperage

Watts is a measure of power (technically, Joules/second) analogous to speed (miles/hour). So you need to convert the power into energy (like speed into distance). Here's an easy conversion factor:

> If a device draws 1 watt constantly for a year, then its energy consumption was 9 kWh. That corresponds to about $1.00.

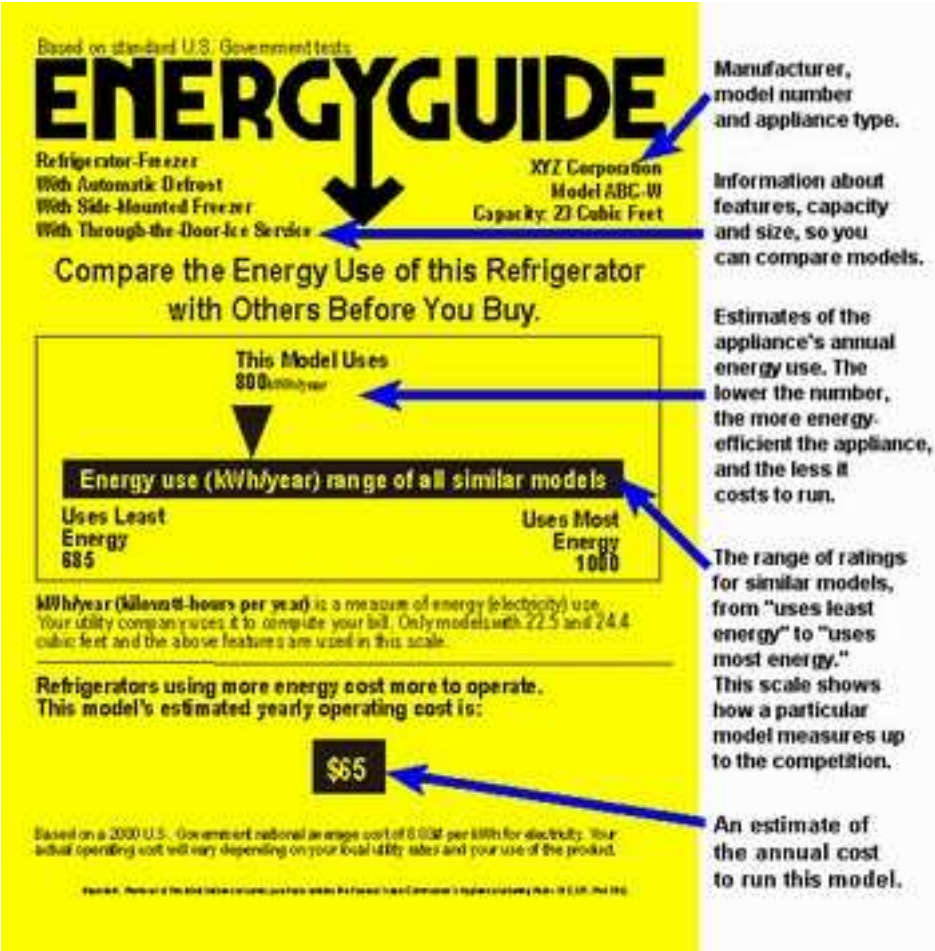
Again, you can usually find the wattage of most appliances stamped on the bottom or back of the appliance, or on its nameplate. The wattage listed is the *maximum* power drawn by the appliance. Since many appliances have a range of settings (for example, the volume on a radio), the actual amount of power consumed depends on the setting used at any one time.

If the wattage is not listed on the appliance, you can still estimate it by finding the current draw (in amperes) and multiplying that by the voltage used by the appliance. Most appliances in the United States use 120 volts. Larger appliances, such as clothes dryers and electric cooktops, use 240 volts. The amperes might be stamped on the unit in place of the wattage. If not, find a clamp-on *ammeter*—an electrician's tool that clamps around one of the two wires on the appliance—to measure the current flowing through it. You can obtain this type of ammeter in stores that sell electrical and electronic equipment. Take a reading while the device is running; this is the actual amount of current being used at that instant.

When measuring the current drawn by a *motor*, note that the meter will show about three times more current in the first second that the motor starts than when it is running smoothly.

Many appliances continue to draw a small amount of power when they are switched "off." These "phantom loads" occur in most appliances that use electricity, such as VCRs, televisions, stereos, computers, and kitchen appliances. Most phantom loads will increase the appliance's energy consumption a few watt-hours. These loads can be avoided by unplugging the appliance or using a power strip and using the switch on the power strip to cut all power to the appliance.

So, when the chart in the Standby Power section says 5 watts, that's 5 x 9 = 45 kWh/year = $5/year. You'll quickly see that almost any single device consumes very little in annual electricity use but when multiplied by 40+ products, the sum is significant and so is your cost.



Important Notes:

1. The amount of electricity listed on the label is the ***maximum*** amount that the appliance will ever use. For example, a 300-watt refrigerator will only run at 300 watts when the compressor's running (which is when it makes that humming sound, indicating that it's actually chilling the air inside). Most of the time the fridge just sits there, using only 5 watts or so for its electronics. If the amount of work done by a device varies up and down, then so does its energy use. (e.g., a stereo that can be turned up or down, an oven that can be set at various temperatures, a fridge that sometimes runs and sometimes doesn't, a computer that sometimes spins its various drives and sometimes has to use more of its brainpower, etc.) The label on computers is particularly useless; a computer labeled at 300 watts probably uses only about 100.

2. Many consumer items are advertised according to their power ***output*****,** not ***input*****.** That means the stereo that says 30 watts on the box might actually require 50 watts to make 30 watts of sound (assuming the volume was cranked) and your 900-watt microwave oven might actually use 1400 watts (on its highest setting). That's because *all electrical devices are inefficient* -- they have to use some extra energy to do what they do.

3. Knowing how much electricity a device uses at a given moment doesn't tell you how much it's using in a month, because it's probably not running 24/7 (and if it *is* running 24/7 like a fridge, it's probably not using the maximum amount of electricity 24/7). To measure how much electricity something uses for a certain period of time (like a week or a month), you can use a *watt-meter*.

4. Some devices use a small amount of electricity even when they're not on. This is called Standby or Vampire Power usage. For example, VCR's and microwaves draw a small amount to power the time display. This amount is often 5 watts or less. Devices which run off transformers also draw a small amount of power.

5. And of course, electricity consumption of a device varies from brand to brand and condition to condition, etc.

FOR THE OUTDOORS

Device	Running Watts
Hedge Trimmer	450
Lawn Mower	1200
Weed Trimmer	500
Edge Trimmer	500
Chain Saw	1200

FOR AN EMERGENCY

Device	Running Watts
Refrigerator / Freezer	1200*
Lamp	100
Sump Pump ½ HP	2100*
Fan	200
Radio / Television	50 - 300

FOR CONSTRUCTION

Device	Running Watts
Battery Charger	500
Belt Sander - 3"	1000
Air Compressor - ¼ HP	975
Air Compressor - 1 HP	1600
Paint Sprayer - Airless	600*
Table Saw	1750 - 4000*
Quartz Halogen Work Light	1000
Reciprocating Saw	960
Circular Saw - 7½"	1400

FOR THE HOME

Device	Running Watts
Light Bulbs - 60 / 70 Watt	60/70
Well Pump	1000
Refrigerator / Freezer	700
Microwave - 1000 Watts	1500
Coffee Maker	1000
Electric Stove - 8" Element	2100
Color TV - 27"	500
Security System	500
Computer with a 17" Monitor	800
½ HP Garage Door	875
Sump Pump ½ HP*	2100

FOR EVENTS

Device	Running Watts
Radio / CD / DVD Players	50 - 200
Inflator Pump	50*
Electric Grill	1650
Box Fan	200
Outdoor Light String	250

HEATING & COOLING

Device	Running Watts
Space Heater	1800
Humidifier – 13 Gal.	175
Furnace Fan Blower – 1/3 HP	700*
Window AC – 12,000 BTU*	3250*
Central AC – 10,000 BTU*	1500*
Central AC – 24,000 BTU*	3800*
Heat Pump	4700

*** Allow 2 times the listed running watts for starting these devices. These are approximate values and you should check the appliance for actual ratings.**

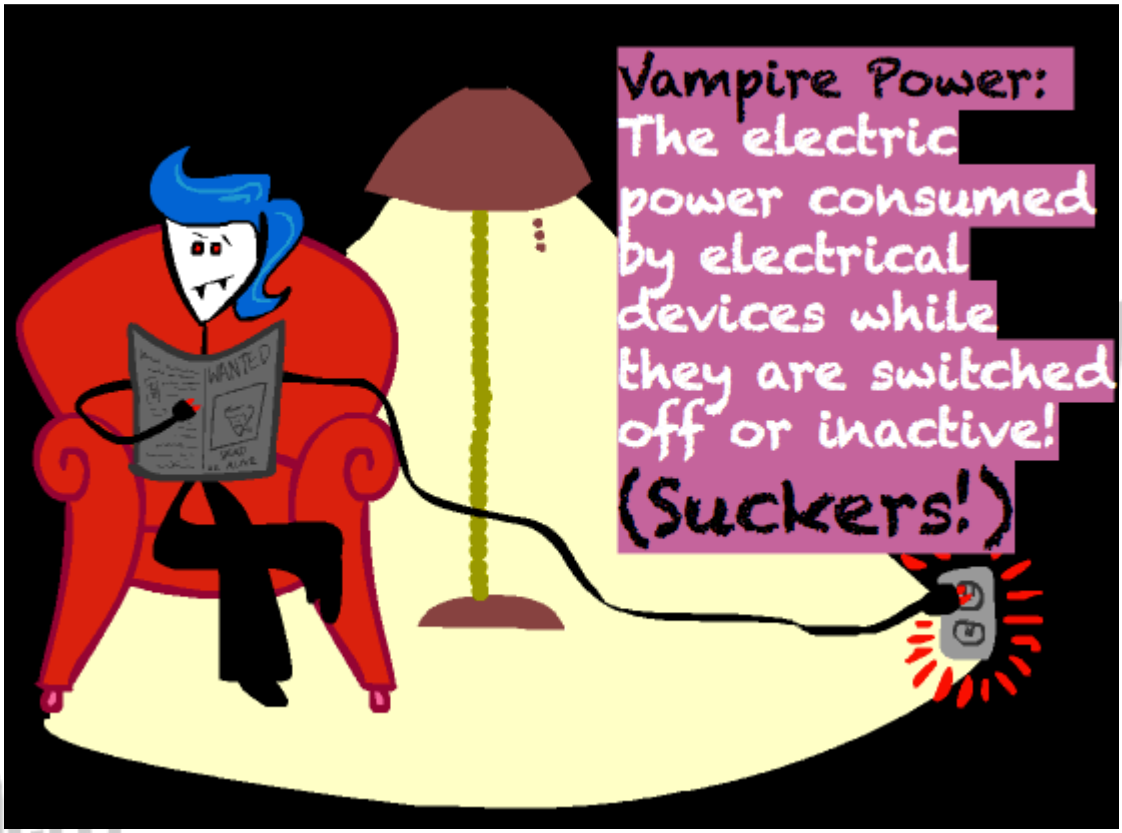
Typical Wattages of Various Appliances, Devices, Products

The chart below is from http://michaelbluejay.com/electricity/howmuch.html and http://www.energysavers.gov/your_home/appliances/index.cfm/mytopic=10040 and gives the average Watts Used by basic household appliances, devices and products.

Appliance, Device, Product	Watts
Aquarium	50–1210 Watts
Clock radio	4-10 watts
Clothes dryer	1800–5000
Clothes dryer (electric)	4400 watts
Clothes iron	1000–1800
Clothes washer	350–500
Coffee maker	900 watts
Coffee maker	900–1200
Computers	(see more about electrical use of computers at http://michaelbluejay.com/electricity/computers.html
Computers 17" CRT monitor	90 watts
Computers 17" LCD monitor	40 watts
Computers Desktop Computer & 17" CRT monitor	150-340 watts
Computers Desktop Computer & Monitor (in sleep mode)	1-20 watts
Computers Laptop computer	45 watts
Computers Personal computer - CPU - awake / asleep	120 / 30 or less
Computers Personal computer - Laptop	50
Computers Personal computer - Monitor - awake / asleep	150 / 30 or less
Cooling 36" ceiling fan (high speed)	55 watts
Cooling 42" ceiling fan (low speed	24 watts
Cooling 48" ceiling fan (high speed)	75 watts
Cooling 52" ceiling fan (high speed)	90 watts
Cooling Central AC fan (no cooling)	750 watts
Cooling Central Air Conditioner (2.5 tons)	3500 watts
Cooling Evaporative cooler	400 watts
Cooling Fans - Whole house	240–750
Cooling Fans- Ceiling	65–175
Cooling Fans- Furnace	750
Cooling Fans- Window	55–250
Cooling Floor or box fan (high speed)	100 watts
Cooling Tiny window unit AC	500 watts
Cooling Whole-house fan	350 watts
Cooling Window unit AC, huge	1440 watts
Cooling Window unit AC, medium	900 watts
Dehumidifier	785
Dishwasher (using the drying feature greatly increases energy consumption)	1200–2400
Dishwasher (washer doesn't heat water)	1200 watts
Dishwasher (washer heats water)	2000 watts

Electric oven, self-cleaning mode (takes 4.5 hrs, 5.3 kWh total)	1178 watts
Hair dryer	1200–1875
Heating , Waterbed heater	1100 watts
Heating , Waterbed heater (avg. 10 hrs./day)	450 watts
Heating furnace Elec., 1000sf, warm climate	7941 watts
Heating furnace Elec., 2000sf, cold climate	26,500 watts
Heating Furnace, Gas (for the blower)	750 watts
Heating Heater *(portable)*	750–1500
Heating heater, Electric (medium)	900 watts
Heating Heater, electric (low)	600 watts
Heating heater, Electric space (high)	1440 watts
Heating Water bed *(with heater, no cover)*	120–380
Lighting 60-watt light bulb (incandescent)	60 watts
Lighting CFL light bulb (60-watt equivalent)	18 watts
Lighting LED night light	0.5
Lighting Night light	5
Microwave oven	750–1100
Microwave oven or 4-slot Toaster	1440 watts
Radio *(stereo)*	70–400
Range burner	800 watts
Refrigerator (average)	57-160 watts
Refrigerator (compressor)	200-700 watts
Refrigerator *(frost-free, 16 cubic feet)*	725
Televisions (color)- 19"	65–110
Televisions (color)- 27"	113
Televisions (color)- 36"	133
Televisions (color)- 53"-61" Projection	170
Televisions (color)- Flat screen	120
Televisions 19" CRT television	55-90 watts
Televisions 32" LCD television	125 watts
Televisions 42" LCD television	210 watts
Televisions 42" Plasma television	270 watts
Televisions 50-56" DLP television	170 watts
Televisions 50-56" LCD television	260 watts
Televisions 50-56" Plasma television	340 watts
Televisions HD cable box	45 watts
Televisions VCR/DVD	17–21 / 20–25
Toaster	800–1400
Toaster oven	1225
Total power stored by an alkaline AA battery. This is to put batteries into perspective. If you could power your clock radio with an AA battery, it wouldn't even last an hour. There is more on batteries in Guide to Household Batteries at http://michaelbluejay.com/batteries/	3 watt-hours
Vacuum cleaner	1000–1440
Videogames Nintendo Wii (source http://www.hardcoreware.net/reviews/review-356-2.htm)	18 watts
Videogames PS2	30 watts

Videogames PS3	194 watts
Videogames Xbox	70 watts
Videogames Xbox 360	185 watts
Washing machine	See http://michaelbluejay.com/electricity/laundry.html
Water heater *(40 gallon)*	4500–5500
Water heater (electric)	3800 watts
Water pump *(deep well)*	250–1100



Standby, Vampire, Phantom Power

A surprisingly large number of electrical products—TVs to microwave ovens to air conditioners—cannot be switched off completely without being unplugged. These products draw power 24 hours a day, often without the knowledge of the consumer. This power consumption is called "Standby Power" or "Vampire" or "Phantom power."

A laypersons definition of Standby Power is: Electricity used by appliances and equipment while they are switched off or not performing their primary function. That power is consumed by power supplies (the black cubes—sometimes called "vampires"—converting AC into DC), the circuits and sensors needed to receive a remote signal, soft keypads and displays including miscellaneous LED status lights. Standby power use is also caused by circuits that continue to be energized even when the device is "off". An international technical standards committee is developing a definition and test procedure.

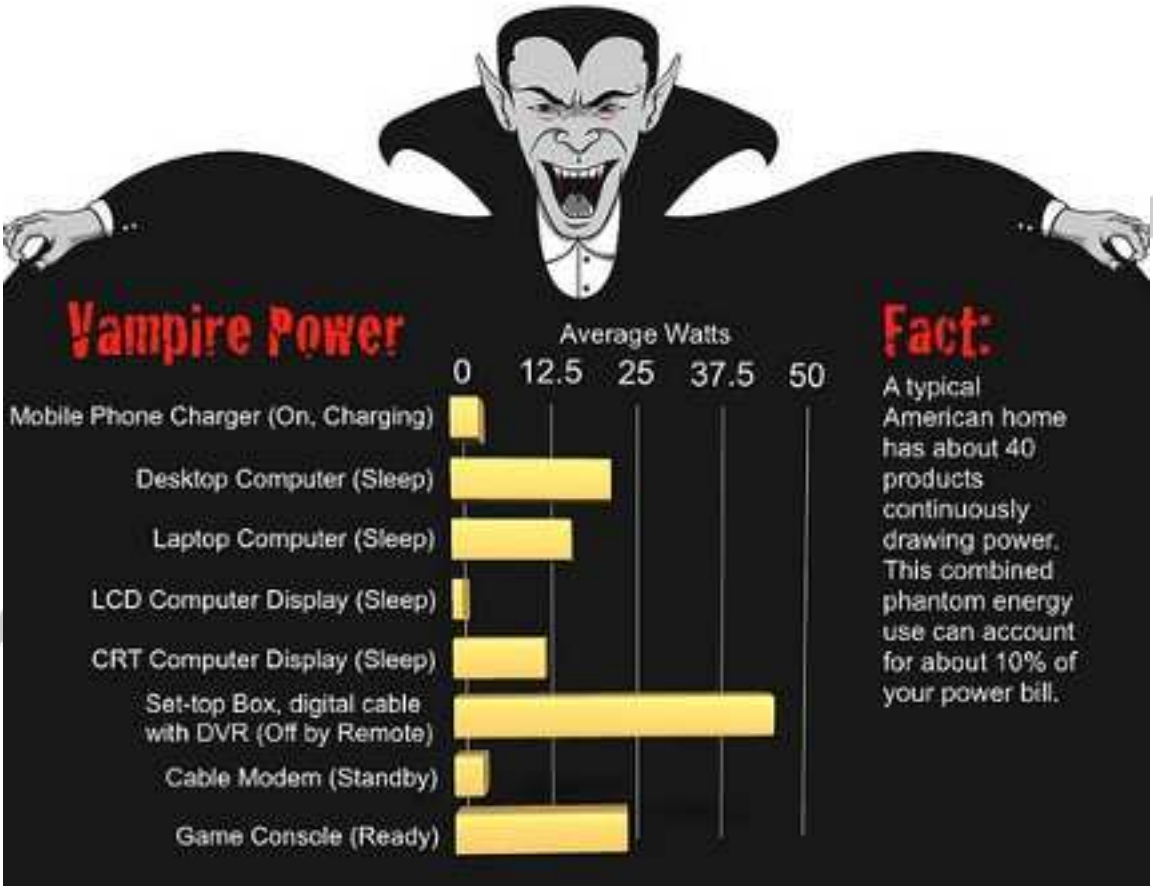
Almost any product with an external power supply, remote control, continuous display (including an LED), or charges batteries will draw power continuously. Sometimes there is no obvious sign of continuous power consumption and you need a meter to be certain.

An individual product draws relatively little standby power but a typical American home has forty products constantly drawing power. Together these amount to almost 10% of residential electricity use.

Some Standby power is not necessary, however, sometimes certain appliance functions do require small amounts of electricity include:

- Maintaining signal reception capability (for remote control, telephone or network signal)
- Monitoring temperature or other conditions (such as in a refrigerator)
- Powering an internal clock
- Battery charging
- Continuous display

Good design can make the power requirements for these functions very low (but not yet zero).



The chart below from http://standby.lbl.gov/summary-table.html gives a good example of standby power usage from common devices.

> The government measured the standby power of many, many, products. The table below summarizes those measurements, with the average, minimum, and maximum power levels observed while in standby. Power consumption is listed in "watts" (W). The "Count" refers to the number of products that the government measured.
>
> Some cost effectiveness assumptions were made by the government: Annual energy use is based on the manufacturer-declared standby power level as measured by the International Electrotechnical Commission (IEC) test procedure 62301 v1.0–2005 and an assumed 6,000 hours per year in the lowest power consuming mode. Annual Energy Cost assumes a

federal electricity price of 8¢ per kWh. Lifetime Energy Cost is the sum of the discounted value of annual energy costs based on average usage and an assumed product life of 4 years. Future electricity price trends and discount rates are based on federal guidelines effective April 2009 through March 2010.

TOP FIVE ENERGY VAMPIRES

1. Computers and computer-related equipment such as modems, routers, printers and fax machines.
2. Instant-on TVs, such as plasma, LCD and rear projection. In most instances, the larger the screen, the more energy it uses.
3. Surround sound systems.
4. Cable or satellite TV boxes.
5. Any items that maintain a clock: microwave, programmable coffee maker, all digital clocks and DVD/VCR machines.

Source: Salt River Project

Standby Power Summary Table by Appliance, Device, Product

Device/Model	Average (W)	Minimum (W)	Maximum (W)	Count
Air Conditioner, room/wall OFF	0.9	0.9	0.9	1
Amplifier- Off	0.27	0	1.8	7
Amplifier- On, not playing	33.99	21.4	70.93	6
Amplifier- On, playing	39.16	21.11	69.3	6
Audio Minisystem- Cassette, not playing	13.85	1.67	33.14	24
Audio Minisystem- CD playing	19.09	5.2	41.2	24
Audio Minisystem- CD, not playing	13.99	1.67	36.95	28
Audio Minisystem- Off	8.32	0.3	24.58	27
Audio Minisystem- Radio playing	14.41	2.98	38	28
Caller ID Unit-ready	1.27	1.27	1.27	1
Cassette Deck- Off	0.54	0	1.08	2
Cassette Deck- On, playing	5.72	5.2	6.25	2
Cassette Deck- Ready	4.53	4.36	4.7	2
CD Player- Off	5.04	2	18.4	7
CD Player- On, not playing	8.62	4	25.7	7
CD Player- On, playing	9.91	5.8	25.6	7
Charger, mobile phone- On, charged	2.24	0.75	4.11	4
Charger, mobile phone- On, charging	3.68	0.27	7.5	23
Charger, mobile phone- Power supply only	0.26	0.02	1	32
Clock- On	1.74	0.99	3.61	21
Clock- Radio playing	2.95	1.7	4.2	2

Clock, radio-on	2.01	0.97	7.6	23
Coffee Maker-off	1.14	0	2.7	12
Computer Display, CRT-off	0.8	0	2.99	21
Computer Display, CRT-on	65.1	34.54	124.78	21
Computer Display, CRT-sleep	12.14	1.6	74.5	14
Computer Display, LCD-off	1.13	0.31	3.5	32
Computer Display, LCD-on	27.61	1.9	55.48	31
Computer Display, LCD-sleep	1.38	0.37	7.8	30
Computer, desktop- Off	2.84	0	9.21	64
Computer, desktop- On, idle	73.97	27.5	180.83	63
Computer, desktop- Sleep	21.13	1.1	83.3	52
Computer, notebook- Fully on, charged	29.48	14.95	73.1	13
Computer, notebook- Fully on, charging	44.28	27.38	66.9	8
Computer, notebook- Off	8.9	0.47	50	19
Computer, notebook- Power supply only	4.42	0.15	26.4	19
Computer, notebook- Sleep	15.77	0.82	54.8	16
Copier-off	1.49	0	2.97	2
Copier-on	9.63	3.6	14	3
DVD Player- Off	1.55	0	10.58	33
DVD Player- On, not playing	7.54	0.24	12.7	33
DVD Player- On, playing	9.91	5.28	17.17	33
DVD Recorder-off	0.75	0	1.5	2
DVD/VCR- Off	5.04	0.09	12.7	21
DVD/VCR- On, not playing	13.51	8.48	20.5	21
DVD/VCR- On, playing	15.33	9.43	22.37	19
Fax, inkjet-off	5.31	0	8.72	3
Fax, inkjet-on	6.22	2.89	14	8
Fax, laser- Off	0	0	0	1
Fax, laser- On	6.1	6.1	6.1	1
Fax, laser- Ready	6.42	6.42	6.42	1
Game Console- Active	26.98	5.4	67.68	24
Game Console- Off	1.01	0	2.13	26
Game Console- Ready	23.34	2.12	63.74	24
Garage Door Opener-ready	4.48	1.8	7.3	34
Heating, furnace central-off	4.21	0	9.8	16
Heating, furnace central-on	339.71	70.5	796	14
Hub, USB-off	1.44	0.95	1.81	5
Hub, USB-on	2.06	1.06	3.55	7
Low-voltage Landscape-ready	1.13	1.1	1.17	2
Microwave Ovens- Cooking	1433.	966.2	1723.	18
Microwave Ovens- Ready, door closed	3.08	1.4	4.9	18
Microwave Ovens- Ready, door open	25.79	1.6	39	17
Modem, cable-off	3.84	1.57	6.62	8
Modem, cable-on	6.25	3.64	8.62	16

Modem, cable-standby	3.85	3.59	4.11	2
Modem, DSL-off	1.37	0.33	2.02	16
Modem, DSL-on	5.37	3.38	8.22	20
Multi-function Device, inkjet-off	5.26	0	10.03	23
Multi-function Device, inkjet-on	9.16	3.9	17.7	24
Multi-function Device, laser-off	3.12	0	4.7	3
Multi-function Device, laser-on	49.68	5	175	4
Musical Instruments-off	2.82	1.2	4.2	9
Night Light, interior-off	0.05	0	0.34	10
Night Light, interior-on	4.47	0	27.97	19
Night Light, interior-ready	0.22	0	1.2	8
Phone, cordless- Active (talking)	1.9	0.59	3.38	33
Phone, cordless- Ready, handset	2.81	1.05	4.89	35
Phone, cordless- Ready, no handset	1.58	0.59	3.09	35
Phone, cordless with answering machine- Active (talking)	3.53	2.2	6.5	21
Phone, cordless with answering machine- Off	2.92	0.9	7.4	11
Phone, cordless with answering machine- Ready, handset	4	2.15	7.4	20
Phone, cordless with answering machine- Ready, no handset	2.82	1.72	4.7	20
Phone, cordless-Off	0.98	0.54	1.8	10
Power Tool, cordless- Active	29.53	1.39	66	16
Power Tool, cordless- Ready	1.74	0	4.7	23
Power Tool, cordless- Ready, charged	8.34	1.82	14	5
Printer, inkjet-off	1.26	0	4	25
Printer, inkjet-on	4.93	1.81	22	25
Printer, laser-off	1.58	0	4.5	7
Printer, laser-on	131.07	1.7	481.9	5
Range, gas-ready	1.13	0.7	1.7	4
Receiver (audio)- Off	2.92	0	19.7	18
Receiver (audio)- On, not playing	37.61	17.1	65.2	18
Scanner, flatbed-off	2.48	0.27	8.2	6
Scanner, flatbed-on	9.6	1.71	15.6	10
Security Systems, home-ready	2.7	2.7	2.7	1
Set-top Box, digital cable- Off by remote	17.83	13.24	30.6	14
Set-top Box, digital cable- Off by switch	17.5	13.7	26.3	16
Set-top Box, digital cable- On, TV off	24.65	14.2	74.74	18
Set-top Box, digital cable- On, TV on	29.64	14.1	102.23	18
Set-top Box, digital cable with DVR- Not recording, TV off	44.63	44.38	44.87	2
Set-top Box, digital cable with DVR- Not recording, TV on	44.4	44.2	44.6	2
Set-top Box, digital cable with DVR- Off by remote	43.46	43.3	43.61	2

Set-top Box, DVR- Off	36.68	23.3	48.6	4
Set-top Box, DVR- On, no recording	37.64	25.95	49.2	4
Set-top Box, DVR- On, recording	29.29	27.27	31.3	2
Set-top Box, satellite- Off by remote	15.66	6.58	33.05	25
Set-top Box, satellite- Off by switch	15.47	6.58	32.7	31
Set-top Box, satellite- On, TV off	15.95	7.69	33.2	33
Set-top Box, satellite- On, TV on	16.15	7.69	33.2	33
Set-top Box, satellite with DVR- Not recording, TV off	28.35	25.8	30.9	2
Set-top Box, satellite with DVR- Not recording, TV on	31.37	24.2	36.3	3
Set-top Box, satellite with DVR- Off by remote	27.8	22	33.6	2
Speakers, computer- Off	1.79	0	5.6	19
Speakers, computer- On, no sound	4.12	0.69	9.84	21
Stereo, portable- Cassette, not playing	2.42	1.16	5.92	13
Stereo, portable- CD playing	6.8	3.96	9.2	15
Stereo, portable- CD, not playing	4.11	1.29	6.83	15
Stereo, portable- Off	1.66	0.7	5.44	19
Stereo, portable- Radio playing	3.3	1.36	8.25	20
Subwoofer- On, not playing	10.7	5.8	20.6	7
Subwoofer- On, playing	12.42	5.9	20.6	6
Surge Protector-off	1.05	0	6.3	6
Surge Protector-on	0.8	0	6.92	43
Telephone Answering Device- Off	2.01	1.31	2.55	7
Telephone Answering Device- Ready	2.25	1.42	2.83	7
Television, CRT- Off by remote	3.06	0.3	10.34	38
Television, CRT- Off by switch	2.88	0	16.1	58
Television, rear projection- Off by remote	6.97	0.2	48.5	16
Television, rear projection- Off by switch	6.6	0.2	48.5	15
Television, rear projection- On	186.09	186.09	186.09	1
Television/VCR- Off by remote	5.15	2.15	13.3	6
Television/VCR- Off by switch	5.99	2.15	13.11	7
Timer, irrigation- Off	2.75	1.5	5.9	14
Timer, irrigation- Ready	2.84	1.5	5.9	16
Tuner, AM/FM- Off	1.12	0	3.37	3
Tuner, AM/FM- On, not playing	9.48	5.08	16.4	3
Tuner, AM/FM- On, playing	9.92	5.07	17.7	3
Turntable (audio)- Off	0.2	0	0.6	3
Turntable (audio)- On, not playing	6.01	1.72	12.8	3
VCR- Off	4.68071	1.2	9.9	14
VCR- On, not playing	7.77	3.8	11.62	14

Fact: The EPA estimates that energy vampires consume $4 billion worth of power per year. That's equal to the amount of electricity generated by 12 power plants!

Figure A: Where Are the Watts Going?

Some appliances use more power than others even when doing nothing. Until recently, manufacturers didn't worry about standby power because consumers didn't consider the cost.

	Watts consumed	Yearly cost @ 8¢ per kw
Portable stereo	1 – 8	70¢ – $5.60
Compact system	1 – 25	70¢ – $17.50
Component system	1 – 16	70¢ – $11.12
DVD player	1 – 13	70¢ – $9.10
5 battery chargers	1 each	$3.50
Printer	4 – 6	$2.80 – 4.20
Cable box	5 – 25	$3.50 – 17.50
Modem	4 – 20	$2.80 – 14.00
Satellite system	10 – 20	$7.00 – 14.00
Television	up to 23	up to $16.10
VCR	1 – 14	70¢ – $9.80
Computer (sleep mode)	1 – 6	70¢ – $4.20
Monitor (sleep mode)	up to 15	up to $10.50
Total		**up to $134.00**

Handyman

Power usage

Some Suggestions to Reduce Standby Power Consumption:

- If you aren't frequently using a device, unplug it. (This works fine for the 6th TV in the guest bedroom or the VCR.) *Warning*, don't frequently unplug and plug in appliances because you could get electrocuted from frayed wires and plugs.
- Use a switchable power strip for clusters of computer or video products. That way you can switch everything to zero with one action.
- When shopping, search for low standby products. (Asking a salesperson will probably be a waste of time.) ENERGY STAR products have lower standby.
- Buy a low-cost watt-meter, measure the devices in your home and take targeted action. You will certainly be surprised at what you discover and this exercise might even pay back the cost of the meter in savings. A list of watt-meters is here.

Limited research suggests that an informed and aggressive approach can reduce standby use by about 30%. Frankly, there are more productive ways to save energy with an investment of an hour but if high standby energy use stands between you and the goal of a zero energy home, then it's an hour well spent.

U.S. DEPARTMENT OF ENERGY

EPA United States Environmental Protection Agency

Legal Authorities

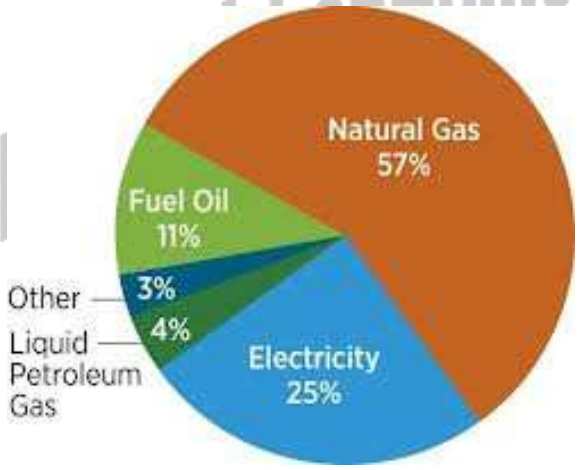
The government (and it's greedy, fat, fudgy fingers) has "several" energy regulations and executive orders to "encourage" a reduction of energy use in general as well as Standby power. Many products have reduced their Standby power usage, but many more new products come into the market place each day that do not.

> Federal agencies are required by the National Energy Conservation Policy Act (P.L. 95-619), Executive Order 13423 and Federal Acquisition Regulations (FAR) Subpart 23.2 and 53.223 to specify and buy ENERGY STAR®-qualified products or, in categories not included in the ENERGY STAR program, FEMP-designated products which are among the highest 25 percent of equivalent products for energy efficiency.
>
> Agencies are required by the Energy Independence and Security Act of 2007 and Executive Order 13221 to purchase products with a standby power level of 1 watt or less.

The government has a chart on its "Performance Requirements for Federal Purchases" that can be helpful in looking for appliances, devices and products with low Standby power usage. You can find this at: http://www1.eere.energy.gov/femp/pdfs/pseep_lowstandbypower.pdf. For detailed model information see: http://www1.eere.energy.gov/femp/technologies/printable_versions/buying_low_standby.html#moreinfo . For major appliances always look for the "ENERGY STAR" logo.

The government also makes a few energy cost effectiveness assumptions:

> Annual energy use is based on the manufacturer-declared standby power level as measured by the International Electrotechnical Commission (IEC) test procedure 62301 v1.0–2005 and an assumed 6,000 hours per year in the lowest power consuming mode. Annual Energy Cost assumes a federal electricity price of 8¢ per kWh. Lifetime Energy Cost is the sum of the discounted value of annual energy costs based on average usage and an assumed product life of 4 years. Future electricity price trends and discount rates are based on federal guidelines effective April 2009 through March 2010.

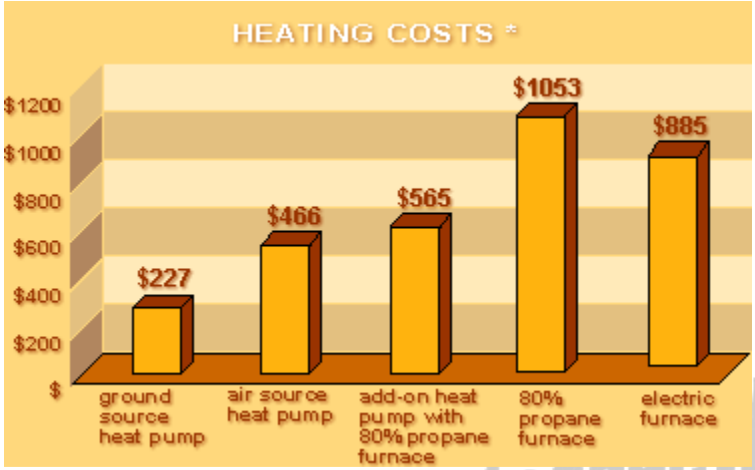


Estimating and Comparing Home Heating

You probably wonder how much it actually costs to heat your home during the cold winter months. You might also wonder if you should make an investment in upgrading your home's heating system and if it's worth that investment. The choices of heating systems and fuel types can be overwhelming. If you're building a new home, purchasing an existing home or thinking about replacing your home's heating system, contact your utility company for their estimates the on your annual heating costs for many of the heating system options offered today.

You may first want to start by learning more about how your home's heating system works before you jump into choosing which system to purchase. You should know some basic information about the types of fuels you can use and how they compare in terms of price. Don't reach for the phone to contact an HVAC specialist until you've had a chance to read through the information we provide on these topics and more.

To come up with more realistic cost effectiveness and to adjust this cost-effectiveness "rule of thumb" for a different electricity price, multiply the typical lifetime energy cost savings by this ratio: (Your price in ¢/kWh) ÷ (8.0¢/kWh). To adjust for the hours a device is consuming power at the standby power level, multiply the typical lifetime energy cost savings above by this ratio: Your hours ÷ 6,000 hours.



The Most Common Fuels Used for Home Heating:

Natural gas - measured in cubic feet. Residential customers typically purchase natural gas in units of 100 cubic feet - or Ccf. (A Ccf is also referred to as a "therm.") Your monthly natural gas usage can be found in the Natural Gas Section of your bill. Typical average residential usage is 80 Ccf.

Electricity - measured in watt hours. Residential customers purchase electricity in kilowatt hours - or kWh. A kilowatt hour is equal to 1000 watt hours. Your monthly electric usage can be found in the Electric Section of your bill. Typical average residential usage is 1000 kWh. There are 3,412 BTUs per kWh.

Propane (LP) gas - measured in gallons. Residential customers purchase propane gas in gallons. There are 91,000 BTUs per gallon.

Fuel Oil - measured in gallons. Residential customers purchase fuel oil in gallons. There are 140,000 BTUs per gallon.

It appears that each fuel type has its own unit of measurement; however, there is a common unit of measurement that applies to all of these fuel sources. It's a BTU — or British Thermal Unit. If you were to strike a single match, it would put off the same amount of heat contained in a BTU.

Fuel is converted into heat through your home's heating system. To compare different heat fuels, use the common unit of measure applied to all fuels - "Cost per Million BTUs (MBTUs)" .

There are many variables that will contribute to the cost of heating a home. From age, quality of insulation, type of HVAC system, to the geographical region and so on.

Some great online calculators are listed below.

http://www.eon-us.com/rsc/hec.asp
http://www.homeheatingoilprices.com/energy-calculators.php
http://www.homeheatingoilprices.com/Heating_Articles.php
http://www.ehow.com/how_5372424_calculate-home-heating-costs.html
BP has a great little calculator page for determining your "energy profile" based on country, number of people in the household, general type of home and what heating fuel type.
http://www.bp.com/iframe.do?categoryId=9023118&contentId=7045317&nicam=USCSEnergy_LabQ109&nisrc=Google&nigrp=Energy_Lab_Calculator&niadv=Energy_Calculator&nipkw=energy_estimate
For an interesting comparison chart for Kentucky see: http://www.eon-us.com/rsc/lge/res_heating_costs.asp

Most of these calculators will require you to complete some if not all of the following information:

- Your energy use and costs for the last year: You'll need your last 12 months of utility bills OR a 12-month summary statement from your utility company.
- Energy sources for your home: natural gas, electricity, fuel oil, propane and/or kerosene?
- The square footage of your home.

Or you can calculate this yourself: How to Calculate Home Heating Costs by Soren Bagley from
http://www.ehow.com/how_5372424_calculate-home-heating-costs.html

The price of heating a home is one of the most significant utility costs that homeowners face. Because there are so many options when it comes to heating your home, it is useful to be able to compare the different costs. Calculating the cost of home heating can also be beneficial if you're choosing a new home. Over the long run, moving into a place that has lower heating costs can considerably reduce your cost of living.

Determine the cost of heating your home per 1 million Btu

- Step 1 Determine the type of fuel your residence uses. The two most common are natural gas and electricity.
- Step 2 Determine the cost of this fuel type per unit. The unit of measurement is going to vary depending on what the specific fuel is. For example, if the residence uses natural gas, it will be measured in British thermal units (Btu); if the residence uses electricity, it will be measured in kilowatt-hours (kwh). The cost of fuel per unit can be found by referring to your heating bill or calling your local energy supplier.
- Step 3 Go to the home heating cost calculator found in the Resources section below.
- Step 4 Enter the price you pay per unit beside your fuel type in field A.
- Step 5 Press "Calculate." The number provided is the cost of heating your home per 1 million Btu.

Determine the average number of Btu required to heat your home

- Step 1 Determine the climate zone in which your residence is located. To do this, return to the home heating calculator found in the Resources section and scroll down the page to the blue text that says
- Step 2 Determine the size of your residence in square feet. If you are researching for a future residence, you can get this information from the current homeowner or sales agent. If you want to know the square footage of your own home, you can simply add up the square footage of each room to get a good estimate. You do not need an exact measurement; for our purposes it is sufficient to know whether the size of your residence is closer to 1,500 square feet or 2,500 square feet.

- Step 3 Refer to the table provided in field D of the home heating calculator. Applying the information gathered regarding your residence's climate zone and square footage, use the chart to determine the average Btu that your home requires per month.

Determine the cost of heating your home per month

- Step 1 Return to field A in the home heating cost calculator and make sure that the information you entered regarding your fuel type is still there. If it is, move on to the next step; if it isn't, re-enter the information and press "Calculate" again.
- Step 2 Scroll down to field E of the cost calculator and select your current heating source again from the drop-down list provided.
- Step 3 Enter the average number of Btu required to heat your home beside your selected fuel type. The average number of Btu is the number that was obtained in Section 2, Step 3 of this article.
- Step 4 Click "Calculate." The box beside the equals sign in field E will automatically display the average cost of heating your home per month.

Tips & Warnings

- Natural gas is sometimes measured in cubic feet. If your home uses natural gas and the units are divided into cubic feet, you can use the natural gas conversion calculator found in the Resources section of this article to convert these units into Btu.

References

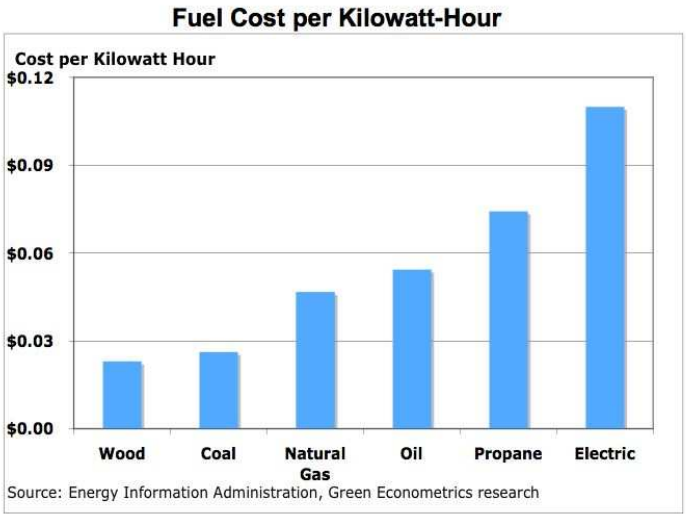
www.eia.doe.gov

Resources

Home Heating Cost Calculator http://www.travisproducts.com/CostOfHeating_WkSht.asp

Natural Gas Conversion Calculator

http://www.eia.doe.gov/kids/energyfacts/science/energy_calculator.html#natgascalc

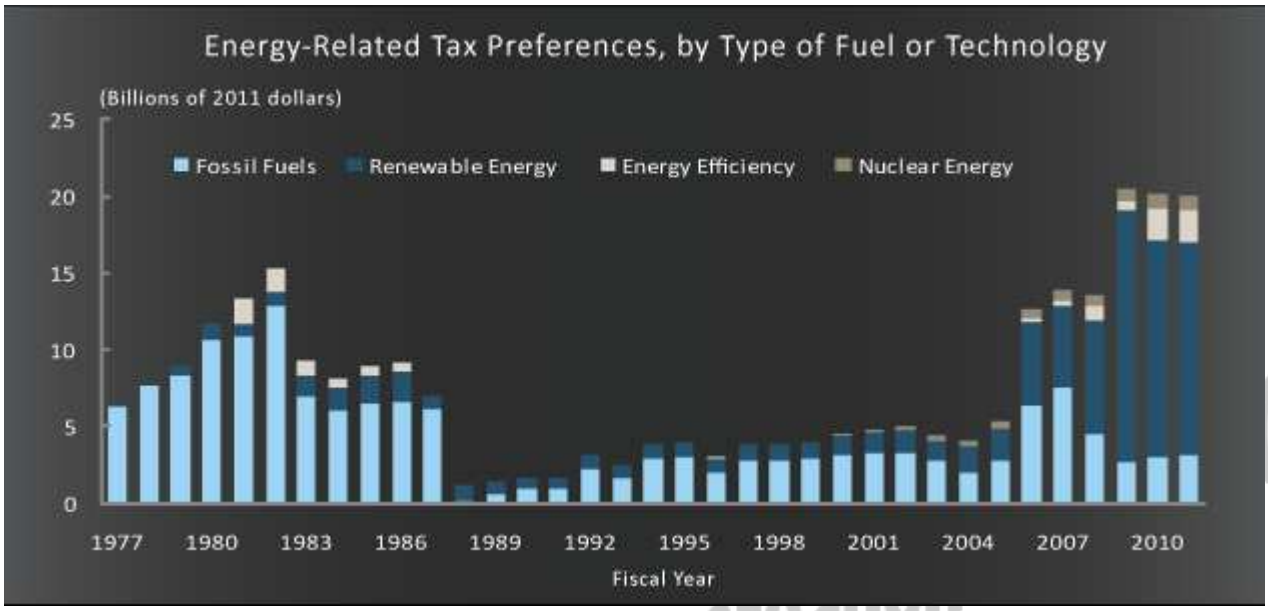


Some Cost Saving Strategies and the Potential Cost Savings

There are tons more energy saving tips from thermal backed curtains; turning the thermostat down to 68 in the winter and up to 74 in the summer; putting power strips on all those devices that generate standby power and turning it off when the product is not in use; thermal pane windows; extra insulation; air tight enclosed entrance foyers; turn the hot

water heater temperature down; adding draft guards to doors and windows; dusk to dawn exterior lighting; solar lighting and so on.

According to Carlo Morelli **you can save up to 10% or more on your heating and cooling energy bill by eliminating as many of the air leaks in your home as possible.** One of the fastest and highest payback dollar-saving jobs you can do around the house is to caulk, seal, and weather-strip all seams, cracks and openings to the outside air.



Here are a few tips to help you get started:

1. Check your home for air tightness. On a windy day, hold a lit incense stick next to locations of potential air paths to the outside, like windows, doors, electrical boxes, plumbing fixtures, electrical outlets, and ceiling fixtures. If the smoke blows horizontally, you have found an air leak that can use weather stripping, sealing, or caulking.

2. Caulk and seal gaps where plumbing, ducting, or electrical wiring penetrate through exterior walls, floors and ceilings.

3. Install rubber gaskets in back of exterior wall outlets and switch plates.

4. Dirty, grimy spots on your insulation can indicate holes where air leaks into and out of your house. Look underneath the insulation batting for holes and gaps and seal them by stapling sheets of plastic over the holes, then caulk the edges of the plastic.

5. In winter, when the fireplace is not being used, keep the flue damper closed tightly. Chimneys are created to allow smoky air to escape, so unless the flue is closed, warm air escapes, and with it, your heating budget.

6. Installing storm windows over single-pane windows or replacing them with double-pane windows is a major savings not to be overlooked. Windows can make up 10% to 25% of your heating bill. Adding storm windows can cut the heat loss in half.

Some additional tips from Gail J Richardson at http://www.articlesbase.com/diy-articles/6-energysaving-tips-to-help-save-you-money-1839954.html:

1. Did you know that in a typical home, electrical appliances such as the television and computers make up for around 20% of the total energy used in a home? That is why when you buy new appliances, you ensure that you only purchase ones that show the energy star. These appliances have been designed specifically for less energy use.

2. Turn off any appliances that are not being used. This is something that you need to get in the habit of because appliances that are not being used can waste a lot of energy. So by turning off anything in your home that is not in use will definitely save you a lot of money and energy.

3. Whenever possible it is a smart idea to use energy saving light bulbs in your home. Outdoors you want to use motion detection lights so they are not using constant electricity.

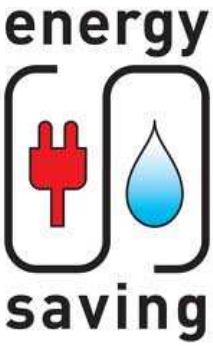
4. The energy saving bulbs will be a bit more expensive to purchase, but they will help you save money with your electric bill each month which means they are not expensive because of the money they save you. These bulbs only use one quarter of the electricity, plus they last a lot longer.

5. Dishwashers and laundry should never be washed until there is a full load or you will be wasting energy. Whenever possible, it is a good idea to air dry your dishes and your clothes to save on the dryer electricity.

6. Many people don't think about the energy being wasted each time you open up the refrigerator. Always know what you want when you get in there and get everything out at once because the more times you open it each day the more energy you are wasting. Be sure that the door is firmly closed each time you open it also so you don't waste energy.

7. Did you know that insulating your windows and doors will help you save money on your electricity bill each month? You want to check all of the doors and windows to find any air leaks.

8. Then take time to seal them with caulking or weather stripping. This will allow the hot and cool air to stay inside longer which means less heating and cooling to save on energy.



How to Save Energy and Money Lighting Your Home [from http://www.hometips.com/diy-how-to/save-energy-money-lighting-home.html](http://www.hometips.com/diy-how-to/save-energy-money-lighting-home.html)

Making energy-efficient light bulb purchases is certainly a major way to trim the fat from your electrical bill, but there are many other techniques you can draw upon.

1) Turn off lights that aren't being used. This is the simplest, most common-sense solution, which can result in surprisingly significant energy savings. Consider that a 75-watt light bulb left on for a couple hours daily can comprise up to 2 percent of your overall monthly lighting bill. Shut it off when you leave the room.

2) Be sure to dust. A dusty bulb is an inefficient bulb. Get out the dust rag, and get your money's worth from your lighting.

3) Use task lighting. Don't flood an entire room with light when all you need is a small reading lamp. Choose lighting that meets your specific functional needs.

4) Place lamps in corners. Doing so allows light to bounce off two wall surfaces, meaning you will need fewer lights overall.

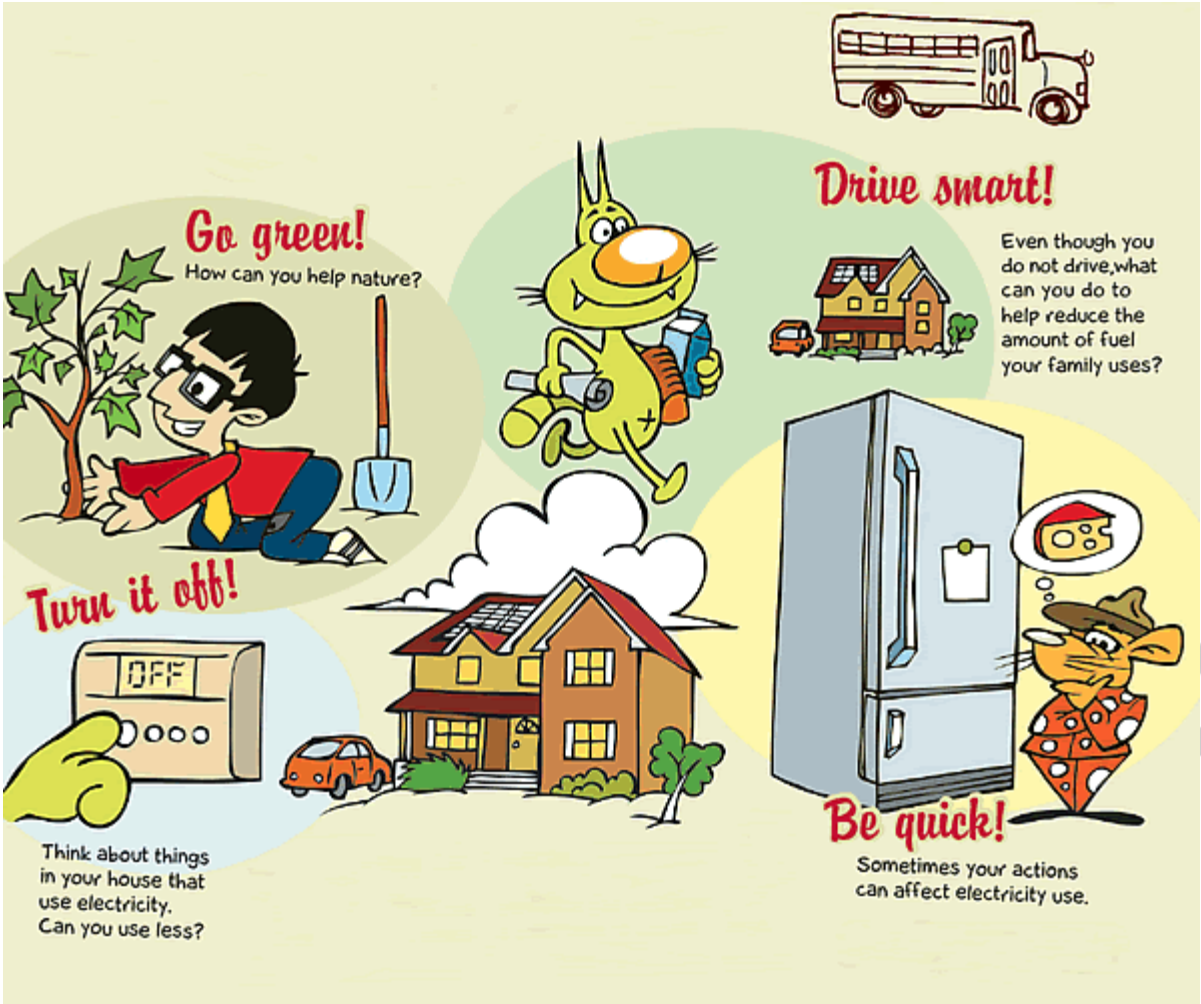
5) Choose light colors when painting your walls. Light reflects off pale tones more easily than it does off dark shades, allowing you to use lower-wattage light bulbs in your home. Where glare isn't a problem, consider paints that have high reflective values.

6) Use day lighting techniques. This is the practice of using natural light for illumination. Enhancing your home's day lighting can mean everything from simply moving your desks and work surfaces closer to sunny windows to installing new skylights. See Day lighting Techniques for more on these methods.

7) Use automatic timers and/or dimmers. Timers, which regulate electrical usage by turning on and shutting off lighting sources at set times, and dimmers, which allow you to modulate the brightness of a lighting source, can contribute greatly to energy savings. For more on these, see Light Switch Options and Lighting Dimmer Switches.

8) Don't neglect outdoor lighting. Outside lights are often left on unnecessarily. Using things such as timers, motion or photoelectric sensors, or solar power with your exterior lighting setup can be helpful. For more, see Energy-Efficient Outdoor Lighting.

Some excellent detailed energy savings tips can be found at: http://www.doityourself.com/scat/saving



Here's an estimate of how much some electrical energy strategies can save you:

Strategy	Up Front Cost	Savings Per Year
Use space heaters to heat only the rooms you're in, (rather than a central system that heats the whole house), and turning off the heat when you're not home.	$80	$1286
Use ceiling fans instead of the air conditioner	$100 if you don't already have ceiling fans	$665
Turn off lights you're not using	$0	$219
Wash laundry in cold water instead of hot or warm	$0	$167
Sleep your computer when you're not using it	$0	$143
Use a clothesline or a laundry rack instead of a dryer	$20	$141
Turn off a single 100-watt light bulb, from running constantly	$0	$96
Replace top-loading washer with front-loading washer	$500	$90
Replace 1990 fridge with 2000+ model	$300	$45
	$1032 one time expense	$2942 every Year

Assumptions:
National average electrical rate of 12¢/kWh.
(1) One 5000-watt central system running 24/7 for four months, vs. two 1500-watt heaters running 8 hours a day for four months.
(2) Stop running a 3500-watt AC 12 hours a day for five months, use two large ceiling fans instead, 12 hours/day.
(3) Five 100-watt light bulbs on for 10 hours a day when they don't need to be.
(4) 1/3 of loads originally on the Hot/Warm setting and 2/3 on Warm/Warm setting; electric water heater; 8 loads/week.
(5) Computer system sleeps for 21 hrs/day @ 5 watts, vs. on for 24 hrs/day @ 160 watts
(6) 36¢/load as per the clothes dryers page, 8 loads a week. (Gas dryer isn't much better @ 34¢/load.)

(8) Ten 15-watt fluorescent bulbs vs. 60-watt incandescent bulbs, each burning 5.5 hours a day.
(9) All loads washed on Warm/Warm setting. 8 loads/week. Water heated electrically. Includes water costs.
(10) Replacing a 900 kWh/year top-freezer model with a 450 kWh/year top-freezer model

"Learning is not compulsory... neither is survival."
W. Edwards Deming

TNT
A 50 Something, homesteading, Prepper ;-}