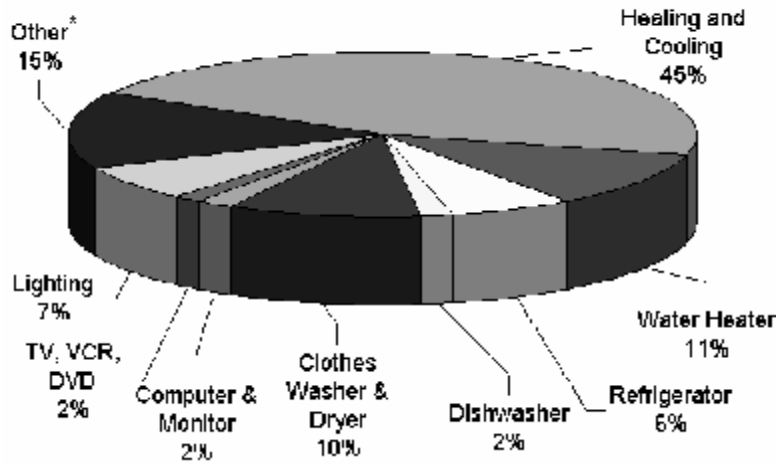


Know Where Your Electric Baseload Dollar Goes

ELEC 5
Thursday, May 25, 2006
10:40 – 12:20

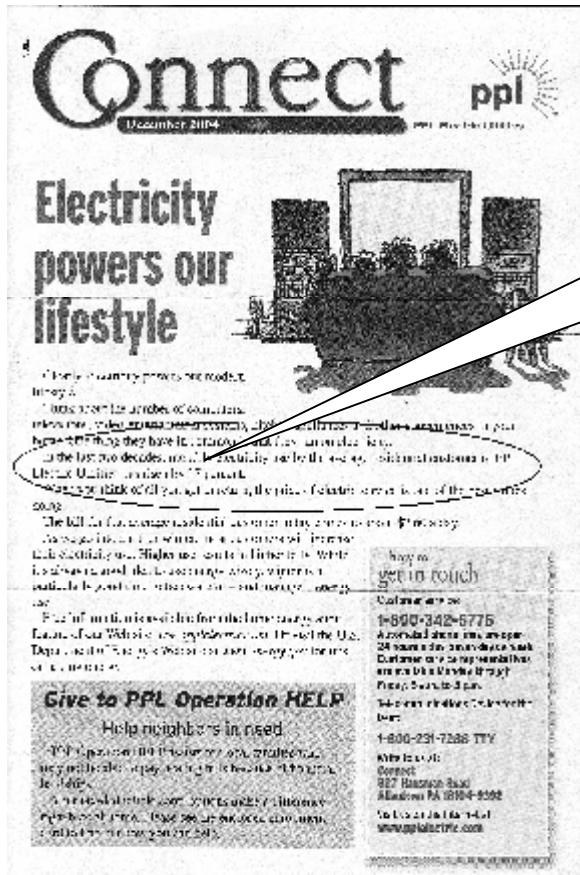
A. Tamasin Sterner
Pure Energy

What does my energy bill pay for?



* "Other" represents an array of household products, including stoves, ovens, microwaves, and small appliances. Individually, these products account for no more than about 2% of a household's energy bills.

Source: http://www.energystar.gov/index.cfm?c=products.pr_pie&layout=print



"In the last two decades, monthly electricity use by the average residential customer of PPL Electric Utilities has risen by 17 percent."

Note: Much of the increased use in electricity is probably for baseload end users such as personal electronics.

Electric Baseload Savings Introduction

What does Baseload mean?

- Baseload is the **base** electric load – the portion of a customer’s electricity use that is pretty constant all year – made up of the lights and appliances that are used all year. Air conditioning and heating are not considered baseload in most climates.
- Baseload does show some variation throughout the year. Lights and water heaters are on more in the winter months, and refrigerators, well pumps and dehumidifiers use more in the summer months.
- Baseload is usually figured by looking at the previous 12 months electricity use, taking the lowest three months, calculating the average monthly use for that period and multiplying it by 12 months to get the annual baseload use.

Why do we look at Baseload?

- The greater the use, the greater the savings potential. If the baseload use is low, the savings potential for reducing baseload use is low. If the baseload use is high, the savings potential for reducing baseload use is high.
- Baseload use is affected by the number of people in the household, the size and efficiency of the lighting and appliances; and strongly by the habits of the people using the lighting and appliances.
- Some people use more electricity for their lighting and appliances than they do for their heating and air conditioning.
- Occupant education is a key to a successful Baseload program. Putting costs on behaviors is very important. A good “cost per use” chart can help the weatherization contractor assign costs on appliance behaviors. If the contractor knows the wattage of an appliance, and also knows how long or how often an appliance is used, she/he can calculate the approximate cost to use the appliance.

What is the savings potential for Baseload work?

- Each household needs to be addressed individually because lighting and appliance use is so site specific.
- If a household of four without an electric water heater uses more than 600 kWh a month, there is a good chance the baseload can be reduced.
- If a household of four with an electric water heater uses more than 1,000 kWh a month, there is a good chance the baseload can be reduced.

How do we focus our efforts to reduce electric Baseload use?

- Familiarity with low, mid and high use ranges helps focus efforts. Savings follows use. People have appliances and lighting that use electricity all year round. Some families use these things very little and some families use them a lot. Medium and large loads that are connected all the time, such as refrigerators and water heaters, are the ones that usually can be replaced or modified to make the largest difference in the electric baseload use.

Feel free to laminate this page and use it when doing a Baseload Audit.

Preparing for a Baseload Audit and/or Energy Education Visit

1. Get the customer's kWh Information from their electric utility whenever possible.
2. Familiarity with low, mid and high use ranges helps focus efforts. Use the information from the utility usage printout to help focus your work in areas with the greatest potential to save electricity. For example, compare the annual baseload with the chart below. Does it look like the household uses a lot of electricity? If not, you won't need to spend as much time in the house because there is little potential for savings. This can direct you to areas that have the greatest potential for savings opportunities. **Savings follows use.**
3. Focus on the things THIS household uses. If there is high electricity use, the problem might be:
 - WASTE – the family members are making wasteful choices. Or,
 - PROBLEMS WITH THE STRUCTURE – attic insulation is inadequate or the attic floor needs to be air sealed. Or,
 - PROBLEMS WITH THE APPLIANCES, EQUIPMENT OR MECHANICAL SYSTEMS IN THE HOUSE – the water heater leaks or the cooling or heating system has problems.

When making the initial contact, ask for the number of people in the household.

Annual End Use Consumption Ranges (kWh)

Typical Electricity Users	Low	Mid	High
Domestic hot water, 1-3 people	2500	4500	6000
Domestic hot water, 3-6 people	4000	6000	8000
Refrigerator, freezer, each	500	900	1500
Clothes dryer	400	900	1200
Indoor lighting	300	900	1200
Cooking	200	400	750
Clothes washer	125	300	700
TV / VCR / DVD	150	350	600
Outdoor lighting	50	250	500
Miscellaneous	100	200	400
Dishwasher (not incl. hot water)	100	200	350
Stereo, other electronics	75	200	300
Hair dryer / curling iron	25	50	75
Subtotals	4,525 to 6,025 (avg. 14 kWh /day)	9,150 to 10,950 (avg. 28 kWh/day)	13,575 to 15,575 (avg. 40 kWh/day)

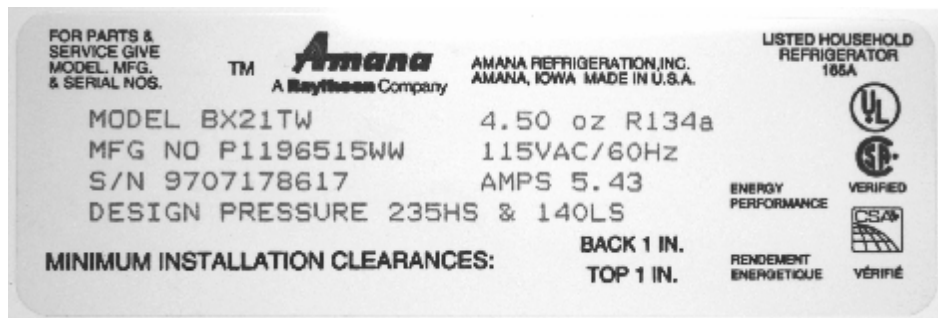
Sources: John Krigger, Chris Dorsi "Residential Energy: Cost Savings and Comfort for Existing Buildings" and Rana Belshe, 2003, modified.

How can we be even more accurate auditors?

Sometimes, information on the appliance nameplate is helpful.

When is Nameplate Data Useful?

- When the capacity or size of the appliance needs to be known so a comparable replacement size can be ordered
- When an ice maker was installed after the refrigerator sale (can increase the listed energy use by about 20%)
- To find the manufacture year, which may help determine the Federal or State standards the appliance was made to meet
- To find a model and/or serial number to use for database or website research
- To find the designed wattage, amps, horsepower or volts of the appliance in order to calculate or infer annual use – non-thermostatically controlled electric resistance space heaters, pumps, furnace blower motors
- To determine manufactured EER of a room AC unit (EER = Btu/hr. divided by Watts)



Amana refrigerator and nameplate

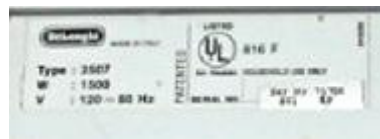
When is Nameplate Date Not Useful?

- When the appliance is controlled by anything that turns it on and off, such as a thermostat or humidistat; the load is variable (*i.e.*, the refrigerator is set to cool to a very low temperature; the kitchen is unusually warm; the dehumidifier is set to very dry setting)
- When the appliance has a motor or circulator that is variable speed and/or goes on or off
- When the appliance has a remote or digital display as it has “on”, “off” and “standby” use
- When the appliance is old or has become less efficient than when manufactured
- House voltage level is higher than 126 volts or lower than 112 volts

Bottom Line: Check the appliance with a wattmeter whenever possible.



Whirlpool dehumidifier and nameplate



DeLonghi electric space heater, 1500 watts. It has three settings that are supposed to use 1500, 900 and 600 watts. On high, it used around 1520 watts and on medium and low it used around 737 watts.

The monthly cost of operating lights and *some* appliances can be calculated by multiplying:

Wattage of the appliance x hours per month used x .001 = kWh per month for that appliance.
kWh per month x the cost per kWh = cost per month to use that appliance.

Example: Three one hundred watt light bulbs that are on for an average of five hours per day will cost:

$300W \times 5 \text{ hrs/day} \times 30 \text{ days /month} \times .001 = 45 \text{ kWh per month}$

$45 \text{ kWh per month} \times .10 \text{ kWh (10 cents a kWh for this example)} = \4.50 per month

If the appliance label is missing the wattage information but lists the amps and volts, the watts can be calculated this way:

Watts = Amps x Volts (117 avg.)

So:

Amps = Watts / Volts

And:

Volts = Watts / Amps

Electrical Appliance Metering Equipment

This is a list of Watt meters that can be used to meter refrigerators and other appliances and electrical equipment.

PRODUCT	WEBSITE
Watts Up? Pro	www.professionalequipment.com
Kill A Watt	www.p3international.com
ECM-1200	www.brultech.com
EML 2000	www.electricitymetering.com
Plug Logger	www.dentstruments.com
Watt Stopper	www.wattstopper.com
Brand Electronics	www.brandelectronics.com

WHAT DOES THE FUTURE HOLD?

If Auditors have an idea when in time an appliance's energy consumption began to be regulated, they can use this information to help decide if an appliance ought to be replaced, even without metering the actual use.

Appliance and Equipment Efficiency Standards

In the 1970's and 1980's, some states began to set standards for energy use for certain products if they were purchased and used in their states. Starting in 1987, the U.S. government began to set efficiency standards for how much energy certain products could use. Over the years, the list of products has grown to include lighting, refrigerators, water heaters, air conditioners, clothes washers and furnace fans. For example, as a result of these standards, a typical new refrigerator today uses less than one-third as much energy as a typical one sold in the early 1970's.

The reasons for the national energy efficiency standards include:

- Reduce peak electricity generation needs
- Reduce consumer energy bills
- Cut global warming pollution
- Help wean the U.S. from imported energy sources

President Bush signed into law the Energy Policy Act of 2005 which offers consumers and businesses tax credits beginning in 2006 for purchasing fuel efficient hybrid vehicles and energy efficient appliances and products. The products include items used to make residences more energy efficient, such as insulation, high efficiency windows, heating and cooling systems, as well as photovoltaic and solar water heating systems. The Energy Policy Act of 2005 also set standards for these residential products:

- Ceiling fan light kits
- Dehumidifiers
- Compact Fluorescent light bulbs
- Torchiere lighting fixtures

This year, some groups are working toward new standards for 15 additional products. The proposed standards would first be enacted by states and go into affect starting in 2008. Each recommended standard would result in significant energy savings and be very cost-effective and would have a cost-benefit ratio of at least 4.5 to 1: for every \$1 consumers or businesses invest in improved efficiency, they will save \$4.50 on energy bills over the life of the product.

Residential Baseload Products affected by the Proposed Standards

Compact audio products (systems that have more than one of the following functions: radio tuner, tape player, CD player and MP3 player) would have a cost-benefit ratio of 22.9,

meaning that the user would save \$22.90 in energy costs over the life of the product, even though the new product will cost \$1 more to purchase.

These audio products, similar to other personal electronic devices, have three main power modes: on, standby and off. Many products spend a lot of time in standby mode – not “on” but energized so they can receive a signal from a remote control. Only 28% of compact audio systems manufactured in 2004 met ENERGY STAR specifications, which require a standby power level of 4 W or less if the product has a clock display, and 2 W or less if there is no clock. These specifications mean the product costs about \$1 more to buy, but the extra \$1 is paid back in energy savings in about 3 months.

DVD players and recorders would have a cost-benefit ratio of 4.6. Right now, the ENERGY STAR require that the unit must have a maximum standby energy level of 3 W or less. According to DOE, the current average standby energy use of DVD players is 26.5 kWh per year. Under the proposed regulations, the increased cost of buying a more efficient DVD player is \$1 and pays for itself in energy savings within one year.

Bottle-Type Water Dispensers are commonly used in both homes and offices to store and dispense hot and cold drinking water. The type that dispenses both hot and cold water tend to be much less efficient than the type that dispenses just cold water because they must maintain two tanks at two temperatures in a small space. Adding insulation between the two tanks can reduce standby energy waste. This would add \$12 to the cost of the unit and would pay for itself in energy savings in about 6 months.

Incandescent Reflector Lamps are very common light bulbs used in recessed can light fixtures. There are specified efficacy requirements now (*i.e.*, lumens per Watt must exceed specified minimum values) but some bulbs and some manufacturers have not met these requirements yet, so this is being recommended again.

Pool pumps are baseload products in some climates where pools are in operation all or most of the year and can be among the largest consumers of electricity in the residential sector. For example, in California, pool pumps consume an average of 2,600 kWh per year, which is typically about 44% of the total electricity consumption of a California household. A new, energy efficient pool pump would cost about \$85 more but would save about 260 kWh per year, which would cover the additional cost in a bit less than 4 years.

Portable Electric Spas (Hot Tubs) are electrically heated, self contained tubs. Standby energy consumption represents 75% of the energy used by hot tubs and refers to the energy used to maintain the temperature when it is not being used. Improved covers and insulation can improve efficiency up to 30%. Also, low wattage pumps can save 15% of standby energy consumption of a typical hot tub. These improvements will cost about \$100 which is recovered by energy savings within 4.3 years.

A Brief History of Appliance Standards

Products Included in the National Appliance Energy Conservation Act of 1987

Refrigerators-freezers	Clothes washers
Room air conditioners	Clothes dryers
Central air conditioners and heat pumps	Dishwashers
Furnaces and boilers	Ranges and ovens
Water heaters	Pool heaters
Direct-fired space heaters	Fluorescent lamp ballasts
Freezers	Televisions

Products Added in the Energy Policy Act of 1992

Fluorescent lamps	Showerheads
Incandescent reflector lamps	Faucets and aerators
Electric motors (1-200 hp)	Toilets
Commercial packaged air conditioners and heat pumps	Distribution transformers
Commercial furnaces and boilers	Small electric motors (<1 hp)
Commercial water heaters	High-intensity discharge lamps

Products with Standards Set in the Energy Policy Act of 2005

Residential:

Ceiling fan light kits
Dehumidifiers
Compact fluorescent lamps
Torchiere lighting fixtures

Commercial and Industrial:

Air conditioners and heat pumps
Clothes washers
Distribution transformers (low voltage)
Exit signs
Fluorescent lamp ballasts
Ice makers
Mercury vapor lamp ballasts
Pedestrian traffic signals
Pre-rinse spray valves
Refrigerators and freezers
Traffic signals
Unit heaters

Computers & Home Office Equipment (from BC Hydro)

The number of homes with computer equipment continues to grow at a. Today there are many energy saving or "power management" features available in all types of computers and home office equipment.

When choosing equipment, look for the ENERGY STAR mark, which indicates more-efficient types of equipment. BC Hydro and Natural Resources Canada (NRCan) endorse the ENERGY STAR program of the US Environmental Protection Agency, which establishes minimum standards and power management guidelines for computers and office equipment.

Your computer or other home office equipment may already incorporate some of this technology. Read the owner's manual for each piece of equipment you use. Information on power management features is often provided in a chapter dedicated solely for this purpose. It is important to understand what features your equipment offers and how they operate. In many cases, power management features can be set to minimum or maximum levels depending on your specific uses. Here are some additional tips for conserving energy with computers and home office equipment. We recommend you share these suggestions with others who use your equipment.

General Tips

Computers

- **Turn your computer off when not in use.** This is the single most important thing you can do to reduce energy consumption. Much of the energy use associated with computers is wasted because PCs are often left on when not in use, including nights, weekends, and even extended periods of inactivity during the day. Most experts agree that turning your computer on and off will have no significant effect on its operation or life.
- **Turn off your display device or monitor.** If you must leave your computer on for network applications or other purposes, it makes sense to turn off monitors. Monitors consume a significant portion of the energy used by PCs. Trends toward larger displays, more color, and higher resolution has increased the amount of energy required to operate monitors. Note that a screen saver does not reduce energy consumption.
- **Use a laptop.** A typical laptop computer has a maximum power consumption of 15 watts, and extensive power management capabilities. A typical desktop PC, with display, consumes about 10 times that or 150 watts, and has limited power management features. The potential energy savings from substituting PCs with portable laptops are large, up to 90% or more.

Printers

- **Turn printers off when not in use.** This tip bears repeating. Printers are typically left on for extended periods of time but are active only for only a small percentage. This means conventional printers can waste a significant amount of energy.
- **Laser printers consume a great deal of energy.** It costs less to buy an ink-jet printer and they are clearly the winners in terms of energy savings. Although they generally have lower print quality, recent advances in ink-jet technology have substantially improved print quality and speed. Ink-jet printer speeds are comparable to those of laser printers. However, they are not designed for high volumes, and the cost of ink/toner cartridges may mean higher operating costs per page than for laser printers. Color ink-jet printers, because of the way they operate, are not significantly more efficient than color laser printers.
- **Select a printer with power management capability.** Printers with automatic "power down" features can reduce electricity use by over 65%. These printers automatically power down to

15 - 45 watts, depending on the number of pages per minute produced, after specified periods of inactivity.

What to look for when making a purchasing decision

As mentioned earlier, many manufacturers of computers and home office equipment now offer **energy-saving power management features**. Products incorporating this technology are most easily recognized by the ENERGY STAR label, located directly on the product itself. If you are unsure about the power management features of a particular product, ask the retailer if the product you are considering qualifies as an ENERGY STAR rated product. Ask to see the power management specifications of the equipment you are buying. Some other benefits of equipment with power management features are:

- Because of built-in "power down" modes, and by remembering to turn off your equipment when not in use, computers and home office equipment can last up to ten times longer than conventional products.
- Products using power management features generate up to 25% less heat and tend to be quieter than conventional products.

The chart below illustrates the potential energy savings between conventional computers and home office equipment, and products that feature power management technologies.

Average Annual Energy Consumption*			
Equipment	Conventional Products	Energy Saving Products	Potential Energy Savings
Desktop PCs	250 kWh	125 kWh	50%
Fax Machines	150 kWh	65 kWh	55%
Laser Printers	375 kWh	135 kWh	65%
Copier (Medium)	600 kWh	270 kWh	55%
Copier (Large)	1400 kWh	600 kWh	55%

*Based on using equipment 5 hours a day.

Tips for the home office

- Turn equipment off when it is not in use (except your fax machine). A computer and monitor left on continuously can consume \$147 worth of electricity a year (assuming that sleep mode is not used, at 6.4 cents/kWh). By turning them off when you're not using them, you could save \$100 per year (assuming the computer is on 10 hours/day for 228 days/year, at 6.4 cents/kWh).
- It is a myth that computers use large amounts of energy when starting up, or that constant start-ups damage components or lead to electrical surges. It is much more cost-effective to shut the computer down when you are finished using it, and doing so actually reduces wear on your system.
- If your computer must be left on when you are not using it make sure that you enable the ENERGY STAR power-management feature on your computer for "sleep" mode. Set it to turn the monitor off after 10 minutes and the computer off after 20 minutes. At full power your computer and monitor could draw over 250 watts of power; in "sleep" mode, 15 watts. Screen savers do not save energy and can prevent your computer from "sleeping."
- Reduce the brightness level of the screen to the lowest level you find comfortable.

- Fluorescent desk lamps consume about a quarter of the energy of an incandescent unit, with the same light output, and last about eight times as long.
- Lots of equipment has chargers, such as laptops, cell phones and digital cameras. When they are not charging, unplug them, as they draw some power whenever they are plugged in.

Buying computers and office equipment

- Look for the ENERGY STAR symbol on all your new office equipment. That symbol identifies the most energy efficient models. While saving energy, your equipment will run cooler which can make it last longer. The ENERGY STAR web site, www.energystar.gov has lists of manufacturers and models, along with energy consumption data.
- Buy a flat-screen monitor. They use considerably less energy and are not as hard on your eyes.
- ENERGY STAR laser printers can cut the equipment's energy use by 60% by automatically placing the printer into "sleep" mode.
- ENERGY STAR labeled fax machines have a power-management feature to cut the energy costs associated with fax machines by almost 40%.
- ENERGY STAR labeled scanners can cut electricity use by up to 50% and yet do not cost any more than standard scanners. Entering "sleep mode" when idle may also extend the life of the light source.

Source: <http://www.bchydro.com/powersmart/elibrary/elibrary707.html>

When to Turn Off Personal Computers, from the U.S. Dept. of Energy

If you're wondering when you should turn off your personal computer for energy savings, here are some general guidelines to help you make that decision.

Personal computers use about the same amount of energy to startup as they use when they are on for about two seconds. For energy savings, consider turning off

- the monitor if you aren't going to use your PC for more than 20 minutes
- both the CPU and monitor if you're not going to use your PC for more than 2 hours.

Note: Screen savers are not energy savers. Using a screen saver may in fact use more energy than not using a screen saver, and the power-down feature may not work if you have a screen saver activated. In fact, modern color monitors do not need screen savers at all.

Source: http://www.eere.energy.gov/consumer/your_home/appliances/index.cfm/mytopic=10070

Typical Cost per Use Based on \$.085 per kWh

Use	Time, Quantity or Cycle	Cost
Shower	Per minute, 6 gallons per min. head	8 cents
Shower	Per minute, 2.5 gpm head	3 cents
Bath	Per inch (equals 5 gals)	5 cents
Hair dryer, 1500 watts	Per hour	13 cents
Curling iron	Per hour	1 cent
Laundry, hot wash and rinse	Per load	72 cents
Laundry, warm wash and rinse	Per load	54 cents
Laundry, cold wash and rinse	Per load	4 cents
Laundry, hot wash, cold rinse	Per load	40 cents
Laundry, warm wash, cold rinse	Per load	31 cents
Dryer, 1 load	45 minutes	23 cents
Dishes	By hand, water running	36 cents
Dishwasher	Each load	27 cents
Dripping hot water faucet	1 drop per second	80 cents a day
Waterbed heater	per day, average	43 cents
Drip coffee maker	one pot, brew cycle	2 cents
Drip coffee maker	one pot, warmer, each hour	1 cents
Crock pot	3 hours	6 cents
Toaster oven	40 minutes	9 cents
Microwave	10 minutes	2 cents
Range, stove top	30 minutes	4 cents
Range, oven	1 hour, 350 degrees	18 cents
Window air conditioner	8,000 BTU, 4 hours	17 cents
Window air conditioner	24,000 BTU, 4 hours	68 cents
Box window fan	7 hours	14 cents
Ceiling fan, no lights	7 hours	4 cents
Attic fan	7 hours	34 cents
100 watt incandescent bulb	10 hours	9 cents
100 watt incandescent bulb	100 hours	85 cents
27 watt fluorescent bulb (equals 100)	10 hours	2 cents
27 watt fluorescent bulb (equals 100)	100 hours	21 cents
Space heater, 1500 watt	1 hour	14 cents*
Space heater, 1500 watt	8 hours	\$1.02*
Dehumidifier	24 hours	45 cents
Furnace blower motor/fan, 1/2 H.P.	8 hours	33 cents
Furnace blower motor/fan, 1/3 H.P.	8 hours	29 cents
Furnace blower motor/fan, 1/4 H.P.	8 hours	26 cents
Furnace burner motor	per day	19 cents
Hot water circulating pump	per day	10 cents
Water pump, shallow well	per day	8 cents
Water pump, deep well	per day	15 cents
Computer	1 hour	3 cents
Printer (wattage varies from 3 - 300 watts)		Varies
Fax machine (wattage varies form 15 to 500.)		Cost is low
TV, color	6 hours	13 cents
Fish tank, 50 gals, with light filter and heater	per day	16 cents

* Each degree the heater thermostat is setback saves 1% of the heating cost. If it is a turndown due to a more comfortable home, each degree the thermostat is turned down saves 3% of the heat costs.

Household Appliance Electrical Usage

Appliance	Annual kWh
Heating and Cooling	
Room air conditioner	500-2000
Two and one half ton central air conditioner	2000-8000
Five ton central air conditioner	4000-12,000
Evaporative Coolers	200-2000
8-foot electric baseboard heater	750-2000
Electric furnace	6000-15,000
Furnace fan	300-900
Hot water circulator	250-700
Heat recovery ventilator	400-1100
General Appliances	
Engine block heater	50-400
Clothes dryer	400-1500
Computer	50-350
Ceiling fan	20-50
Whole house fan	60-200
Television, color (solid state)	100-400
Television cable box	40-160
Television off-cycle energy	10-40
VCR cassette recorder	15-40
Hair blow-dryer	8-16
Hand iron	10-100
Heat lamp	10-25
Lighting (average total)	200-2000
Vacuum cleaner	20-80
Water heater (1-3 people)	2,500-6000
Water heater (3-6 people)	4000-8000
Water heater (15 gallon)	2000-3500
Water bed	1000-2000
Hot tub heating (indoor 300-500 gallons)	1500-3000
Hot tub heating (outdoor 300-500 gallons)	3000-8000
Hot tub circulation	1000-2500
Pool circulator	1100-4000
Well pump	250-500
Clothes washers	80-200
Hot wash, cold rinse	1200-1700
Warm wash, cold rinse	600-1000
Cold wash, cold rinse	70-160
Water cooler with hot water	500-900
Kitchen Appliances	
Refrigerator/freezer	

Appliance	Annual kWh
20-year-old manual defrost	1300
20-year-old side-by-side, frost-free	1400-1900
10-year-old	800-1100
New ENERGY STAR qualified	400-540
Freezer	
20-year-old upright, frost-free	1400-2000
20-year-old chest, manual defrost	1100-1300
10-year-old chest	600-800
New ENERGY STAR qualified	370-430
Range (with oven)	200-800
Dishwasher	100-600
Broiler	20-100
Coffee maker	80-200
Microwave oven	100-250
Roaster	20-80
Slow cooker	40-150
Toaster	15-50
Toaster oven	50-300

Assembled from utility studies and utility company information sources.

Source: John Krigger and Chris Dorsi 2004.. "Residential Energy: Cost Savings and Comfort for Existing Buildings". Saturn Resource Management, Inc. Helena, MT.

Typical Wattages for End Uses

End Use	Typical Wattage	End Use	Typical Wattage
Air conditioner, central	3,000 to 4,500	Garage door opener	230
Air conditioner, room	850 - 2,000	Garbage disposal	420
Air filter	60	Halogen torchiere	300
Appliance timer	2	Hot tub, heater and pump	5,560
Aquarium heater	100	Humidifier, no heater	120
Bathroom fan, high efficiency	15	Iron	1,000 – 1,600
Bathroom fan, standard	75	Juicer	90
Battery charger	100	Microwave oven	1450
Blender	380	Mixer	120
Block heater	600 - 1,500	Oil burner	450
Box fan	75	Oxygen concentrator	420 – 575
Bread maker	600	Pressure cooker	1,300
Can opener	100	Printer, desk jet	48
CD player	12	Printer, laser jet	300
Ceiling fan	150	Radon fan	15 to 150
Circular saw	1,150	Range stove top	1,600 – 2,100
Circulator pump	105	Range, oven	3,500
Clock radio	4	Refrigerator	450 – 625
Clothes dryer	4,500 – 5,500	Refrigerator ice maker heater	700
Clothes washer, cold water	360	Roof and gutter cable	7 watts / foot
Coffee maker	1,500 brew, 50 warm	Sander	290
Computer and monitor	200 – 250 each	Scanner	100
Computer, laptop	54	Security light, HPS	70
CPAP	12	Security light, mercury	175
Crock pot	100	Sump pump	200
Curling iron	40	Table saw	1,380
Dehumidifier	250 – 400	Toaster	1,150
Digital satellite system	14	Toaster oven	1,200
Dishwasher	450 – 1,200	TV, big screen, 48"	250
DVD player	14	TV, solid state	100
Electric blanket	175	TV, tube type	210
Electric space heater	1,500	Vacuum cleaner	350
Fax machine	500	Video games	80
Food dehydrator	875	Water heater	4,500
Food processor	690	Waterbed heater	150 - 300
Freezer	330 - 600	Well pump	1,000
Furnace fan	190 – 375	Whole house fan	500

Unit Conversion Tables

Speed

Convert from	To	Formula
Meters Per Second (mps)	Miles Per Hour (mph)	$\text{mps} \times 2.24$
Miles Per Hour (mph)	Meters Per Second (mps)	$\text{mph} \times 0.447$
Knots	Miles Per Hour (mph)	$\text{knots} \times 1.15$
Meters Per Second (mps)	Kilometers Per Hour	$\text{mps} \times 3.6$

Length

Convert from	To	Formula
Meters	Feet	$\text{meters} \times 3.28$
Feet	Meters	$\text{feet} \times 0.305$
Kilometers	Miles	$\text{Kilometers} \times 0.621$
Miles	Kilometers	$\text{Miles} \times 1.609$

Area

Convert from	To	Formula
Square Meters	Square Feet	$\text{sq. meters} \times 10.76$
Square Feet	Square Meters	$\text{sq. feet} \times 0.093$

Power

Convert from	To	Formula
Kilowatts	Watts	$\text{Kilowatts} \times 1000$
Watts	Kilowatts	$\text{Watts} \times 0.001$
Megawatts	Kilowatts	$\text{Megawatts} \times 1000$
Kilowatts	Megawatts	$\text{Kilowatts} \times 0.001$
Watts	Btu/hour	$\text{Watts} \times 3.413$
Btu/hour	Watts	$\text{Btu/hour} \times 0.293$
Kilowatts	Btu/hour	$\text{Kilowatts} \times 3414$
Btu/hour	Kilowatts	$\text{Btu/hour} \times 0.000293$
Watts	Horsepower	$\text{Watts} \times 0.00134$
Horsepower	Watts	$\text{Horsepower} \times 746$
Kilowatts	Horsepower	$\text{Kilowatts} \times 1.34$
Horsepower	Kilowatts	$\text{Horsepower} \times 0.746$

Energy

Convert from	To	Formula
Watt-hours	Kilowatt-hours	$\text{Watt-hours} \times 0.001$
Kilowatt-hours	Megawatt-hours	$\text{Kilowatt-hours} \times 0.001$
Watt-hours	Btu	$\text{Watt-hours} \times 3.414$
Btu	Watt-hours	$\text{Btu} \times 0.293$
Kilowatt-hours	Btu	$\text{Kilowatt-hours} \times 3,414$
Btu	Kilowatt-hours	$\text{Btu} \times 0.000293$
Watt-hours	Horsepower-hours	$\text{Watt-hours} \times 0.00134$
Horsepower-hours	Watt-hours	$\text{Horsepower-hours} \times 746$
Kilowatt-hours	Horsepower-hours	$\text{Kilowatt-hours} \times 1.34$
Horsepower-hours	Kilowatt-hours	$\text{Horsepower-hours} \times 0.746$