Kill-A-Watt Monitor Instructions

This Kill-A-Watt Monitor has been provided by Sustainable Energy Resource Group (802.785.4126, SERG@valley.net, <www.SERG-info.org>). The watt meters and energy library resources were donated by SERG thanks to a grant provided by Vermont Energy Investment Corporation's "Good Ideas Group."
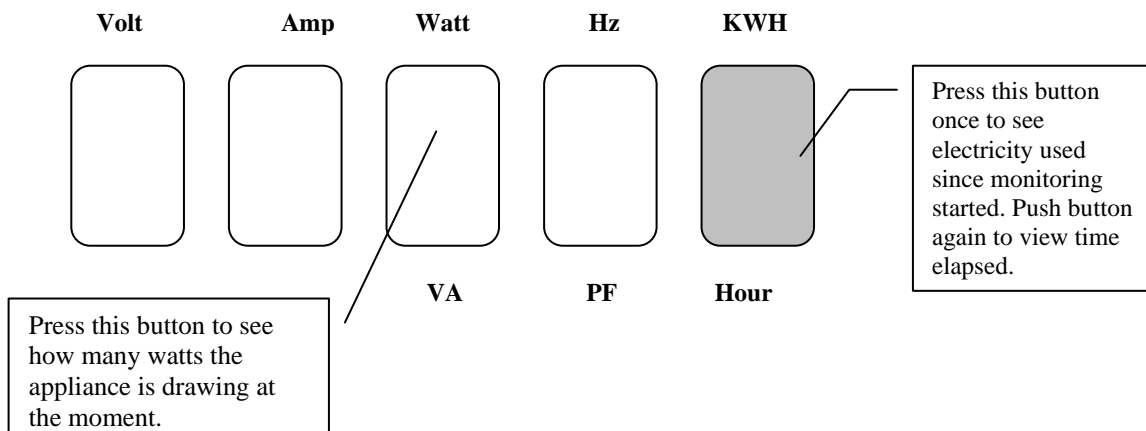
Please take care of the monitor and notify your librarian or town energy committee if it malfunctions. If you would like to purchase your own watt meter, they are available from any of the Solar Stores (<www.usasolarstore.com>, 802.226.7093 & 802.387.2746, solar@usasolarstore.com) for about $30.

This Kill-A-Watt Monitor measures how much electricity a piece of equipment uses. These instructions help you use that information to:
- Determine the cost of running a piece of equipment
- Compare equipment with and get more information on efficient ENERGY STAR models
- Determine if and how much energy a piece of equipment uses when it is not in active use
- Determine what portion of overall electric use a piece of equipment represents
- Determine an appliance's most efficient setting

How to operate the monitor to measure an appliance's electric usage:
1. Plug the Kill-A-Watt monitor into a standard 3-prong outlet.
2. Plug the equipment you want to evaluate into the Kill-A-Watt monitor.
3. Turn on the equipment.
4. To see how much electricity the equipment is drawing, push the Watt/VA button to toggle back and forth between the Watts of electricity the equipment is using at that moment and the Vrms Arms (apparent power).
5. At the end of the monitoring period, push the KWH/Hour button as needed to toggle back and forth between the number of Hours over which the equipment was monitored and the Kilowatt Hours of electricity used over that period. Record the numbers for both Hours and KWH <u>before</u> disconnecting the Kill-A-Watt monitor.The monitor resets each time it is unplugged and when electrical power is cut, e.g., during a power outage. If you unplug the monitor or if there is a power outage before recording the KWH used and the time elapsed since you began measuring, your data will be lost.

Volt	Amp	Watt	Hz	KWH
		VA	PF	Hour

Press this button to see how many watts the appliance is drawing at the moment.

Press this button once to see electricity used since monitoring started. Push button again to view time elapsed.

The monitor displays Hours from 0.01 KWH to 9999 KWH. Time will initially be displayed as Hours:Minutes (from 00:00 up to 99:59) and will then switch to Hours only up to 9999.

Pressing other buttons will show you: **Volts** (Should read something close to 120.0, the standard voltage in US electrical outlets), **Amps** (Measures the flow rate of electric current), and **HZ/PF**: 60 hertz (cycles per second) is the standard for alternating current in US electrical outlets. (PF stands for power factor.) The Volt, Amp, and Hz buttons are not relevant to testing appliances for electrical efficiency.

Determining the Cost of Running a Piece of Equipment
To determine the costs of running a piece of equipment, you need to extrapolate how much energy the equipment uses over the period you want to evaluate, based on the time you monitored the equipment. So if you monitored the equipment for 1 day and you want to know how much it costs to run it for one year, multiply the kWh from the monitor times 365. Then multiply this number of kWhs times $.12 (the average cost of electricity in Vermont is $.12/kWh).

For example, a 14-year-old ENERGY STAR-rated, 21 cu. ft. refrigerator was monitored for 2 days and recorded 3.28kWh usage. To find out how much it costs to run the refrigerator for 1 year:
    365 days / 2 days = 182.5
    182.5 X 3.28 kWh (kWh used over the monitoring period) = 599kWh/yr
    599 kWh X $.12 (average cost of electricity per kWh) = $71.88/yr.

Comparing Equipment with and Getting More Information on New ENERGY STAR Models
Older appliances and equipment, and even some newer ones, are not as energy-efficient as new ENERGY STAR-labeled models. ENERGY STAR-rated equipment uses at least 10-50% less electricity and water than conventional items. Operating less efficient equipment costs you money, in the form of higher electric bills, and increases your carbon footprint. Reducing your electricity usage will save you money and reduce greenhouse gases that cause climate change. ENERGY STAR-rated appliances include refrigerators, freezers, dishwashers, washing machines, room air conditioners, dehumidifiers, televisions, VCRs, DVD players, stereo equipment, cordless phones, home computers, printers, furnaces, boilers and fax machines. For a complete list, visit <www.energystar.gov>.

Continuing with the refrigerator example above, by going to the ENERGY STAR website, clicking on "appliances" then on "refrigerators," you can scroll down to the "Find ENERGY STAR qualified Refrigerators & Freezers" and select the specific brand, type, and volume unit you are looking for to find out how much energy it uses. In this case, a new 20.6 cu. ft. ENERGY STAR-rated refrigerator with top freezer uses 432 kWh/y x $.12 = $51.84/year. This is 167 fewer kWh and $20 lower in electric bills per year than the model discussed above.

Note: The ENERGY STAR website also has information on energy-saving tips related to running different types of equipment and lots of other helpful information.

Determining If and How Much Energy Equipment Uses When Not in Active Use – Measuring Phantom Loads
Some appliances use electricity when they are plugged in, but turned off. Examples include anything with an LED light or digital display that is on when the item is off (microwave, VCR, TV, etc) as well as computers, copiers, fax machines, stereos, DVD and CD players, and satellite receivers. If you want to determine whether an appliance uses electricity when in the off position, plug it into the Kill-A-Watt monitor, turn it off and press the Watt button. If it registers 0.0, the equipment does NOT draw power when it is turned off. If it registers any number other than 0.0, it DOES draw power when not in active use. (Note that it may take a several seconds to register power draw.)

To get an accurate picture of how much power an appliance draws when not in active use, monitor it over a longer period of time, e.g., a day or more. Use the steps above to determine the cost of these "phantom" loads.

Estimates are that 3-5% of the average home's electric use is from wasted phantom loads. You can eliminate this waste and expense by unplugging these appliances when not in use. You can also plug the equipment into a power strip that you turn off when the equipment is not in use. Be sure to use a power strip that doesn't draw power on its own: surge protectors usually draw power as part of their surge protection function. Use the Kill-A-Watt monitor to determine whether your power strip draws phantom loads. With nothing plugged into the power strip, plug it into the Monitor and turn the strip off. If any wattage registers, the strip itself is using energy when off.

Measuring the Percentage of Overall Household Electrical Use
To measure the percentage of overall household electrical use an appliance you monitored represents, record the numbers from your home's electric meter when you first begin monitoring the appliance and again when you stop monitoring. Subtract the starting meter reading from the meter reading at the end of the device test. To determine what percentage of your home's overall use the device represents, multiply the device use in KWH by 100 and divide that number by the home's electric meter use over the test period.

Determining the Most Efficient Setting
Certain appliances—like dehumidifiers, refrigerators, dishwashers, washing machines, and room air conditioners—have various settings. You can use the Kill-A-Watt monitor to determine how much electricity the appliance uses at various settings and adjust the appliance to the setting that uses the least electricity while accomplishing the intended task. To do this simply monitor the device for either a given period of time if it is a device that runs constantly (like a refrigerator) or for a set cycle – a single load of dishes for example. After recording the electric use, unplug the device to zero the Monitor, adjust the device to a different setting, plug it back in and turn it on. Remember that environmental changes can effect your results. For example, a dehumidifier will have to run longer on a humid day, so take this into consideration when comparing settings.

How long should I monitor a piece of equipment?
The length of time you will need to accurately determine electricity usage depends on the equipment you are measuring. Some appliances, like lights, are either on or off and they use the same amount of electricity whenever they are on—unless they are 3-way or dimmable lights. You can use the Kill-A-Watt to monitor for a single hour and use the data to calculate yearly energy use for that item. (There are 8760 hours in a year.)

However, many electrical appliances use varying amounts of energy:
- Certain appliances go through various cycles during normal operation. For example, refrigerators go through standby, cooling, and defrosting cycles. Accurately measuring a refrigerator's energy use requires several days' worth of data.
- Air conditioners and dehumidifiers turn on automatically when settings and atmospheric conditions tell them to, and you can have them set at varying humidity levels and fan speeds, which affect electric usage. Depending on the weather, a few to several days' worth of data may be needed to get an accurate picture of energy use. Viewing the watt usage at different settings may help you in establishing an efficient setting for your situation.
- Electric clothes washers and dryers and dishwashers have varying wash and heat settings that affect the energy use. Monitoring a single use (e.g. one dishwasher load, or an average load of clothes) may be enough to get the data you need, if you usually do not change the settings. However, you can use the monitor to test the electrical use for various settings to select the

setting that achieves the results you want (e.g., clean dishes, dry clothes) with the lowest possible electrical use.

Note: Consumption will be displayed from 0.01 KWH to 9999 KWH. Time will initially be displayed as Hours: Minutes (from 00:00 up to 99:59) and will then switch to Hours only up to 9999. Counters will recycle to zero when they reach their maximum. To reset, remove Monitor from power momentarily.

Reducing Your Carbon Footprint
There are several online calculators for determining your carbon footprint. Because Vermont gets much of its electricity from cleaner sources than some other states, it is most accurate to use a calculator that takes your state of residence into account, such as the Bonneville Environmental Foundation calculator at <www.b-e-f.org>.

Discounts and Tax Credits on Efficient Appliances
Note that Efficiency Vermont offers rebates on energy efficient models of appliances, so check <www.efficiencyvermont.org> before selecting a replacement model for any appliance. Appliances that qualify for Efficiency Vermont rebates vary over time.