

Watts & Watt-Hours

Making Sense of Power & Energy

by Ian Woofenden

Derivation: The watt as a unit (technically one joule per second) was originally proposed in 1882 to honor James Watt, a British engineer who invented an improved steam engine, and coined the term "horsepower."

When Americans measure how fast and how far a vehicle is traveling, we use a rate of miles per hour and a quantity of miles. When we measure water flowing, it's in gallons per minute and gallons. When we measure electrical energy use, the *rate* is *watts* and the *quantity* is *watt-hours*.

If you don't know the difference between a mile and a mile per hour, you'll never understand distance and speed. Get the basic distinction between watts and watt-hours into your head and you'll be on your way to understanding how you use electrical energy in your home—and how to reduce the waste.

A typical inefficient American home uses the energy equivalent of between 25,000 and 100,000 watt-hours (25–100 kilowatt-hours; KWH) of electricity each day, depending on its size, number of occupants, location, heat source, etc. Most analyses show that heating and cooling use 45 to 55 percent of a home's energy. Water heating comes in second, using 13 to 21 percent. Refrigeration may use 5 to 8 percent, lighting 7 to 10 percent, and other appliances and electronics, 20 to 30 percent.

But what's more important than where the energy goes in some fictitious "typical" home is where it goes in *your* home. And there's nothing you can read here that will tell you that—you need to measure it!

To measure electrical energy usage of appliances in your home, you need a meter that measures watts and watt-hours. Several manufacturers make such meters, including popular brands such as the Kill A Watt meter from P3 International, the Watt's Up meter from Electronic Educational Devices, and the Digital Power Meter from Brand Electronics.

Buy one of these meters today, and you can begin to sleuth out where your electricity dollars are going—appliance by appliance. Plug your meter into a wall socket, and start checking appliances with it. Read the watts display, and you will see the rate of energy use for the appliance you're testing. If your TV is drawing 10 watts even when its power switch is off, it's using 10 watt-hours per hour, or 240 watt-hours per day. (See Joe Schwartz's article on phantom loads in *HP117* for more information about how to identify and eliminate small, hidden loads like this.)

For any electrical load with a constant energy draw, you can measure the wattage and then multiply by the hours of use. For instance, if your favorite desk lamp draws 20 watts (you've already upgraded to an efficient compact fluorescent bulb) and you use it four hours a day, the energy load is 80 watt-hours per day.

Appliances that cycle on and off—such as your refrigerator, washer, or coffee maker—take a different approach. Plug the appliance into the meter and leave it for a few days or a week. When your test period is done, divide the KWH consumed by the hours the appliance was plugged into the meter, and multiply by 24 to get KWH per day. Then visit the American Council for an Energy Efficient Economy and Energy Star Web sites for energy-efficient appliance electrical consumption, so you can decide whether it's

time to upgrade your appliances to more efficient ones.

If you want to get a handle on our home's energy usage, understanding the difference between a watt and a watt-hour is the first step. Then you need to buy a meter and get to work on finding out where your watt-hours are going. Determined homeowners can cut their energy use by one third or more by implementing energy efficiency and conservation measures. Give yourself a goal to reduce your energy use, and start identifying and eliminating those wasteful watt-hours today!

Access

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American Council for an Energy Efficient Economy •
www.aceee.org

Energy Star • www.energystar.gov

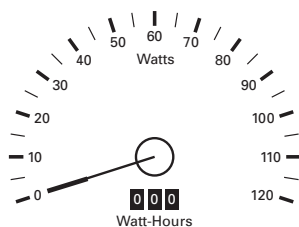
"Finding the Phantoms: Eliminate Standby Energy Loss,"
Joe Schwartz, *HP117*

Watt/Watt-Hour Meters:

Digital Power Meter • Brand Electronics •
www.brandelectronics.com

Kill A Watt • P3 International • www.p3international.com

Watt's Up • Electronic Educational Devices •
www.doublelead.com



Watt = Rate of Energy Use
Watt-Hour = Quantity of Energy

