



Renewable Energy Terms

Watts per Hour? Amps per Hour? No Such Things!

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Would you trust a car salesman who told you that the cruiser you were drooling over got 25 miles per gallon per hour? Or what if a prospective employer said that your pay would be \$10 per hour per day?

I hope you'd be scratching your head and walking the other way. Does the salesman mean 25 miles per gallon, or 25 miles per hour? Does the employer mean \$10 per hour, or \$10 per day? It can't be both. These nonsensical uses of the terminology should be enough to warn you that the person you're talking to is confused at best. It's the same with the phrases "watts per hour" and "amps per hour."

Electrical terminology confusion is a little harder to recognize, and perhaps a bit easier to forgive. The terms do make it tough. When you say "miles per gallon" or "dollars per hour," you know that you're talking about a rate. That "per" is the tip-off.

What's easy to overlook is that "watt" is shorthand for "joules per second," and "amp" is short for "coulombs per second." So "watts per hour" translates into "joules per second per hour," which doesn't make any sense. It can't be both joules per second and joules per hour.

A watt is a rate of energy use, consumption, or transfer. A typical compact fluorescent lightbulb uses energy at the rate of 20 watts. Think "joules per second" every time you say "watt," and see if it makes sense. A joule is a certain amount of energy.

An amp is a rate of charge flow. A certain PV panel might produce at the rate of 5 amps in full sun. Think "coulombs per second" whenever you say "amp" to see if it works. A coulomb is a certain amount of charge.

So the lightbulb mentioned above, if left on, will draw 20 watts all day long. It's drawing 20 watts at lunch, 20 watts at tea time, and 20 watts at dinner. The PV panel will produce at the rate of 5 amps as long as the sun stays at that peak intensity. "Watt" and "amp" are instantaneous measurements of *rates*, like miles per hour and gallons per second.

When we want to talk about accumulated charge or energy, we use the terms "watt-hours" and "amp-hours." That 20 watt light, left on for an hour, will use 20 watt-hours of energy. After an hour in the sun, the 5 amp PV panel will have pumped 5 amp-hours of charge through the battery. Watts times hours equals watt-hours. Amps times hours equals amp-hours. There's no such thing as "watts per hour" or "amps per hour."

Part of the confusion may come from the use of "w/h" and "a/h" as abbreviations for "watt-hours" and "amp-hours." That's incorrect notation, since the slash means "divided by" and is commonly read as "per." It's much clearer to abbreviate them as "WH" and "AH," "W-H" and "A-H," or as in scientific notation, "Wh" and "Ah." The phrase "ampere-hour" may sound like "amp per hour." But it's simply the long form of the term "amp-hour," since "amp" is short for "ampere."

The terms watt and amp designate rates. The terms watt-hour and amp-hour designate quantities of energy and charge. Keep them straight if you want to understand and be understood when talking electricity. And think twice about buying a lightbulb or an RE system from someone who says "watts per hour" or "amps per hour"...

Access

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**Watts
per
Hour**

**Amps
per
Hour**