Basic Electrical Terminology Summary

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I started writing *Word Power* columns when I joined the *HP* crew in 1998, beginning with a piece on "Volt" in *HP68*. Thirty-two columns later, I haven't run out of terms to write about. I've covered all the basic electrical terms, and some not so basic ones too. I look forward to delving into more of the same, and also covering some terminology from specific renewable energy technologies. If you have ideas for future columns, please drop me an e-mail message.

For this, our 100th issue, I'm going to recap and summarize some of the basic electrical terms, with a special emphasis on terms that are frequently misunderstood or confused.

Voltage (V or E) can be thought of as electrical "pressure." It's the push that moves electrons, and hence energy, through wires. Voltage is not an indication of energy capacity. You can have the same voltage in a tiny blood vessel and a huge viaduct, which have very different capacities. Voltage is also known as electromotive force, electrical potential, and electrical potential difference.

Amperage (A or I) is the rate of charge flow. Charges (electrons, in wires) move around or back and forth in a circuit at a certain rate, and the amp is the unit measurement. It's also known as amperes, amps, intensity, electrical current, and coulombs per second. "Current" is not "stuff" that flows through wires, but the *rate* of charge flow. Saying "current flow" is redundant (it's like saying "charge flow flow")—current is the flow rate. **1 amp = 1 coulomb per second = 6.28 billion billion electrons per second**

Amp-hours (AH or Ah) are the units of accumulated or cycled charge. It's the same type of measurement as coulombs. This is a quantity of "stuff," but it's not "used up," it just moves around in a circuit. We also talk about battery capacity in terms of amp-hours (though using watt-hours would make life easier). There is no such thing as "amps per hour" in normal electrical life—don't say it!

Wattage (W or P) is the rate of energy flow. Two things move in electrical circuits—charges and energy. Charges move slowly around or back and forth in a circuit, never leaving. Energy moves almost instantaneously from generating source to load, changing form. Wattage is the rate of energy movement. Other related terms are watts, power, and joules per second. It's a rate, not a quantity of "stuff."

There is a clear, technical difference between "power" (watts) and "energy," (watt-hours). We would be less confused about them if we would observe this difference when we speak and write. In common speech, "power" is very often used to mean "energy," so it's no surprise that many people don't understand the difference. **1 watt = 1 joule per second**

Watt-hours (WH or Wh; KWH or kWh) describes accumulated energy. If a turbine generates at the rate of 100 watts for one hour, it will have generated 100 watt-hours. This is the same sort of measure as joules. Energy, which is measured in watt-hours, is a quantity of "stuff," and is in a sense "used up," but really just changes form, such as from fuel energy to heat, or from wind energy to electricity to light.

Watt-hours are like miles traveled, while watts are like miles per hour. Or to say the same thing another way, "energy" is like distance traveled while "power" is like speed. There is no such thing as watts per hour in normal electrical life—banish this one from your vocabulary too, along with amps per hour. **1 kilowatt-hour = 1,000 watt-hours**

Ohm (R or o or Ω) is the unit of electrical resistance. It is resistance to the flow of charges in a circuit, like friction that slows down a motor belt.

DC stands for "direct current" the one-way movement of charges in a circuit, around and around. There is a distinct positive and negative in DC circuits.

AC stands for "alternating current," the oscillating movement of charges, back and forth in a circuit. Energy is still transferred by these oscillating charges. The polarity (positive and negative) in AC circuits changes many times per second.

Ohm's Law states the relationship between volts, amps, and ohms. It can be presented in three ways:
Amps = Volts ÷ Ohms
Ohms = Volts ÷ Amps
Volts = Amps x Ohms
Example: If a generating source has a voltage of 100 volts and the circuit's resistance is 30 ohms, the amperage will be 3.3 amps.

The **Power Equation** states the relationship between volts, amps, and watts. It can be presented in three ways:
Volts x Amps = Watts
Watts ÷ Amps = Volts
Watts ÷ Volts = Amps
Example: A lightbulb running at 120 volts and drawing 1 amp is using energy at the rate of 120 watts.

You may think that I'm an electrical terminology genius. In fact, I'm a fairly ordinary word nerd and RE maniac who is interested in renewable energy terms. I think it's important to use terminology carefully, and I sympathize with people who are new to these terms, since they can be very confusing.

Each column I write is a learning experience for me. I rely heavily on a string of people who are smarter than I am when I research and write my columns. I would like to thank *all* of my reviewers for their help over the years, and especially Bill Beaty, Hugh Piggott, Clay Eals, Mac McIlvaine, Johann Beda, Allison Bailes, Windy Dankoff, and my dad. I couldn't do this without them.

After quite a few months of work (some) and procrastination (more), and help from a variety of sources and reviewers, *HP* is putting a glossary of renewable energy terms on our Web site. It is available for free download or perusal. This document is a work in progress, and I welcome your suggestions for improvement. You can see it at: www.homepower.com/glossary

Access

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