Introduction to electrical energy April 2003

Electricity is the most common form of energy used in the home. Volts are the unit used to measure the 'strength' of electrical energy, or its 'potential difference'. You can think of it like the water pressure in a pipe. The tap may be shut but the pressure is there all the same.

The 'rate' at which the electricity is passing is the current and is measured in Amperes (Amps), and as the name 'current' implies, you can think of it as the rate of flow of water in a pipe only when the tap is opened.

The 'power' of the electricity that flows is the potential difference (Volts) multiplied by the current (Amps), and is measured in Watts.

The power or 'strength' of water flowing out of the tap depends on the pressure in the pipe and the rate it is allowed to flow by the tap.
For measuring the rate you are using energy, it's therefore Watts that really count

The actual quantity of energy consumed is the power multiplied by the time it was consumed for. For electricity, it is measured in watt-hours or kilowatt-hours (kWh). Using the water analogy, when the tap is opened, a bucket can be filled at a certain rate, say a litre per minute, and the quantity is the total volume of water that has flowed into it after a given time.
So again, for measuring the AMOUNT of electrical energy used, it's watt-hours.

Some examples would be:
10 light bulbs running at 100 watts (a bright standard light bulb) for one hour consumes 1 kilowatt hour of electricity. That's the same as one 2000 watt bar radiator running for half an hour again – 1kWh. Or for that matter, a 6000 watt airconditioner running for ten minutes, two hours of running time for a 500 watt kettle, etc.

The final chunk to understand about electricity is resistance.

When a current flows in an electrical circuit, it meets resistance (this is measured in Ohms), which reduces its rate of flow. In that, it is like the tap, which increases resistance as it is gradually shut, slowing down the rate of the flow of the water. As an electrical resistance decreases, the potential difference (the voltage) decreases and the current (the amperage) increases, and if the resistance increases, the voltage increases and the amperage decreases.

The ratio between volts, amps and ohms is therefore simply expressed by Ohm's Law.
Ohms = Volts / Amps or Amps = Volts / Ohms

One last point about energy. Other kinds of energy, such as gas, are measured in joules, or, more conveniently, in million joule units, or megajoules (MJ). To convert kWh to MJ, multiply by 3.6.

Home Energy Advice Team
Ph: 6260 6165
PO Box 3142
Manuka ACT
2603
email: info@heat.net.au
web: www.heat.net.au