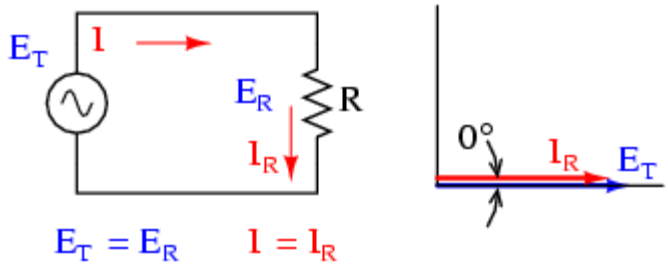
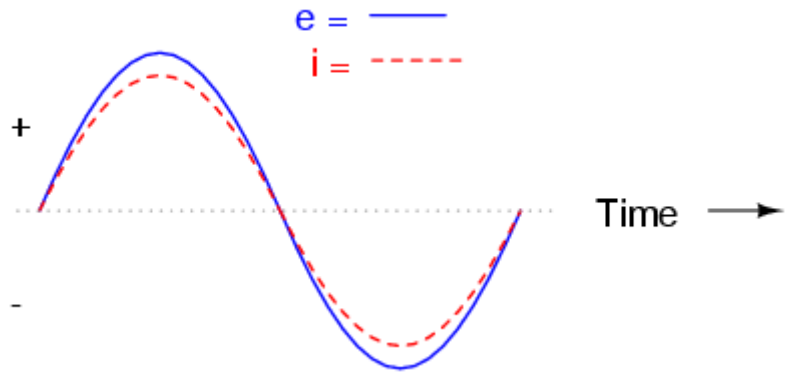
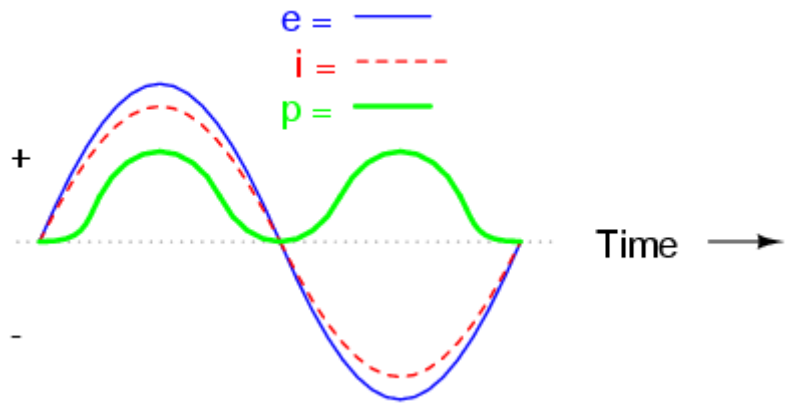
AC resistor circuits



Pure resistive AC circuit: resistor voltage and current are in phase.
If we were to plot the current and voltage for a very simple AC circuit consisting of a source and a resistor (Figure above), it would look something like this:
(Figure below)



Voltage and current "in phase" for resistive circuit.
Because the resistor simply and directly resists the flow of electrons at all periods of time, the waveform for the voltage drop across the resistor is exactly in phase with the waveform for the current through it. We can look at any point in time along the horizontal axis of the plot and compare those values of current and voltage with each other (any "snapshot" look at the values of a wave are referred to as *instantaneous values*, meaning the values at that*instant* in time). When the instantaneous value for current is zero, the instantaneous voltage across the resistor is also zero. Likewise, at the moment in time where the current through the resistor is at its positive peak, the voltage across the resistor is also at its positive peak, and so on. At any given point in time along the waves, Ohm's Law holds true for the instantaneous values of voltage and current.
We can also calculate the power dissipated by this resistor, and plot those values on the same graph: (Figure below)



Instantaneous AC power in a pure resistive circuit is always positive.

Note that the power is never a negative value. When the current is positive (above the line), the voltage is also positive, resulting in a power (p=ie) of a positive value. Conversely, when the current is negative (below the line), the voltage is also negative, which results in a positive value for power (a negative number multiplied by a negative number equals a positive number). This consistent "polarity" of power tells us that the resistor is always dissipating power, taking it from the source and releasing it in the form of heat energy. Whether the current is positive or negative, a resistor still dissipates energy.

Source: http://www.allaboutcircuits.com/vol_2/chpt_3/1.html