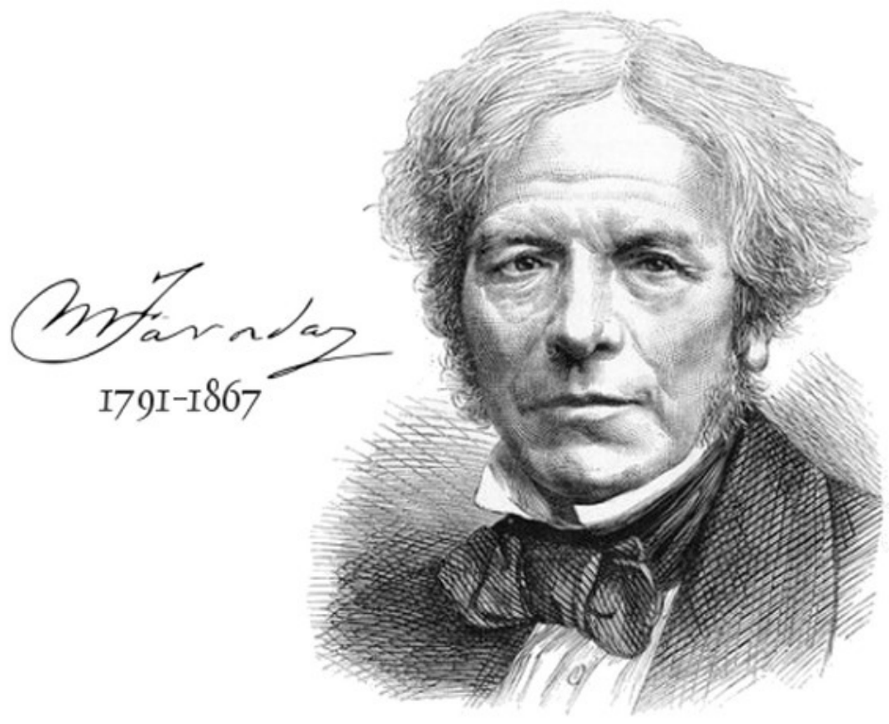
Electricity is often called wonderful, beautiful; but it is so only in common with the other forces of nature. The beauty of electricity or of any other force is not that the power is mysterious, and unexpected, touching every sense at unawares in turn, but that it is under law, and that the taught intellect can even govern it largely.

Michael Faraday



Arizona State University
SES 194

Energy in Everyday Life

DC and AC

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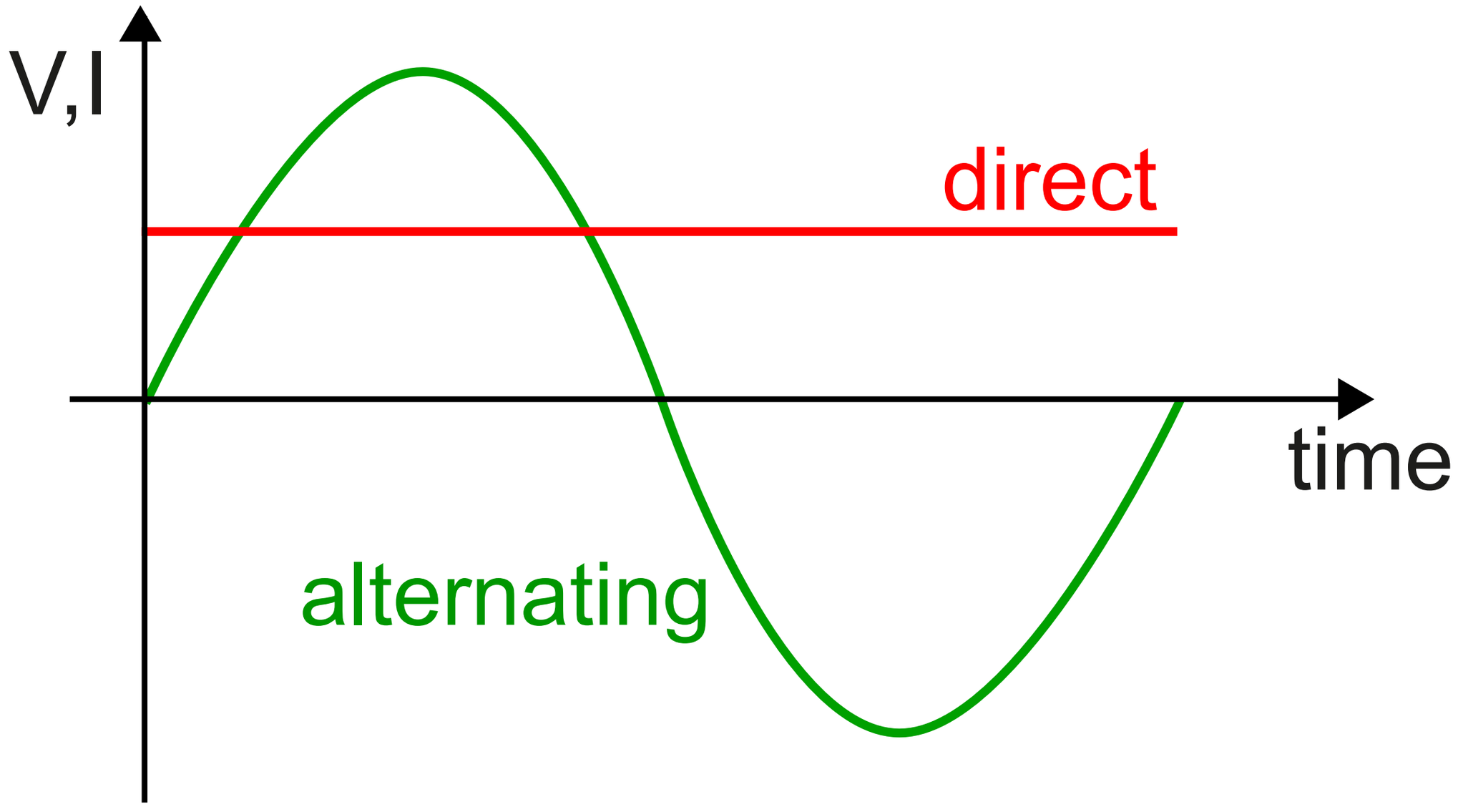
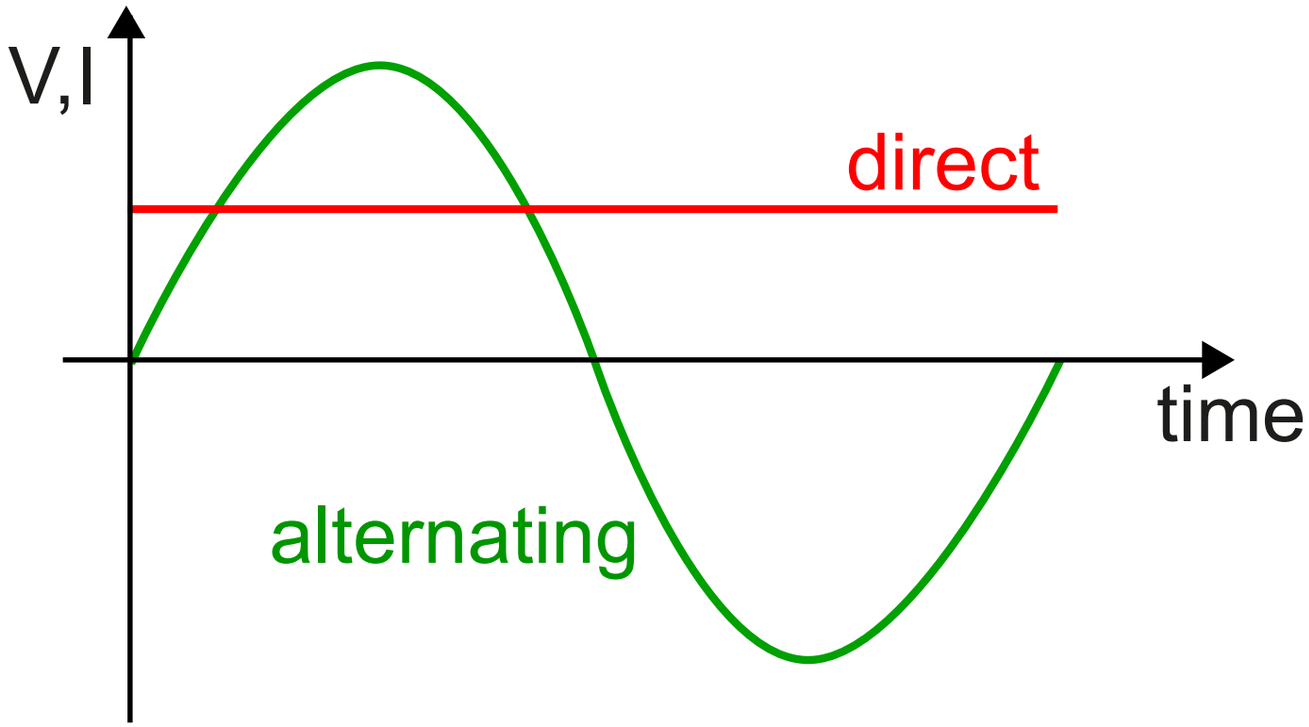
Direct current (DC) and alternating current (AC) are the two primary ways that voltages, currents, and electrical energy are delivered to our everyday devices.



DC is the unidirectional flow of electric charge.



Direct current is produced by sources such as batteries and solar cells.

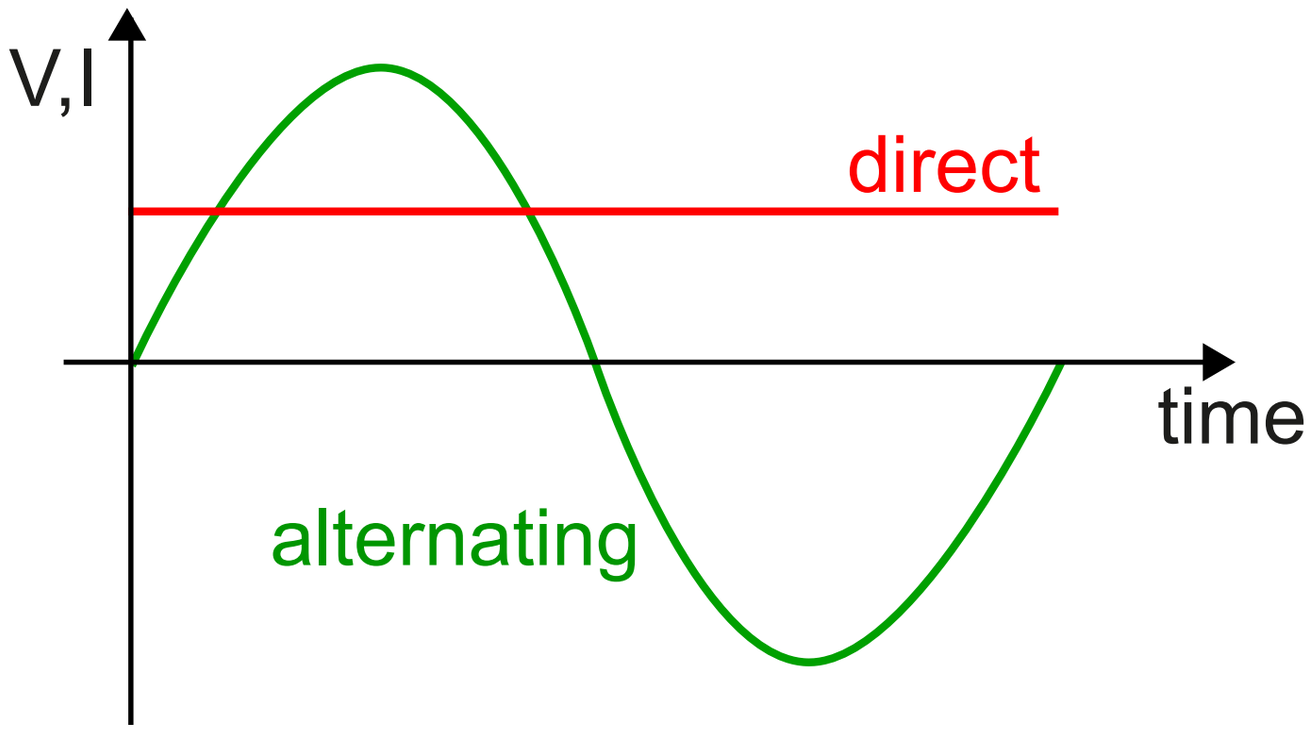
Direct current is used to charge batteries and in nearly all electronic systems.

Large quantities of DC are used in production of aluminum and other electrochemical processes.

DC is used for some railway propulsion, especially in urban areas. For example, the Metro Light Rail system in Phoenix.

High-voltage DC is also used to transmit large amounts of energy from remote generation sites or interconnect AC grids.

AC is the periodic flow of electric charge.

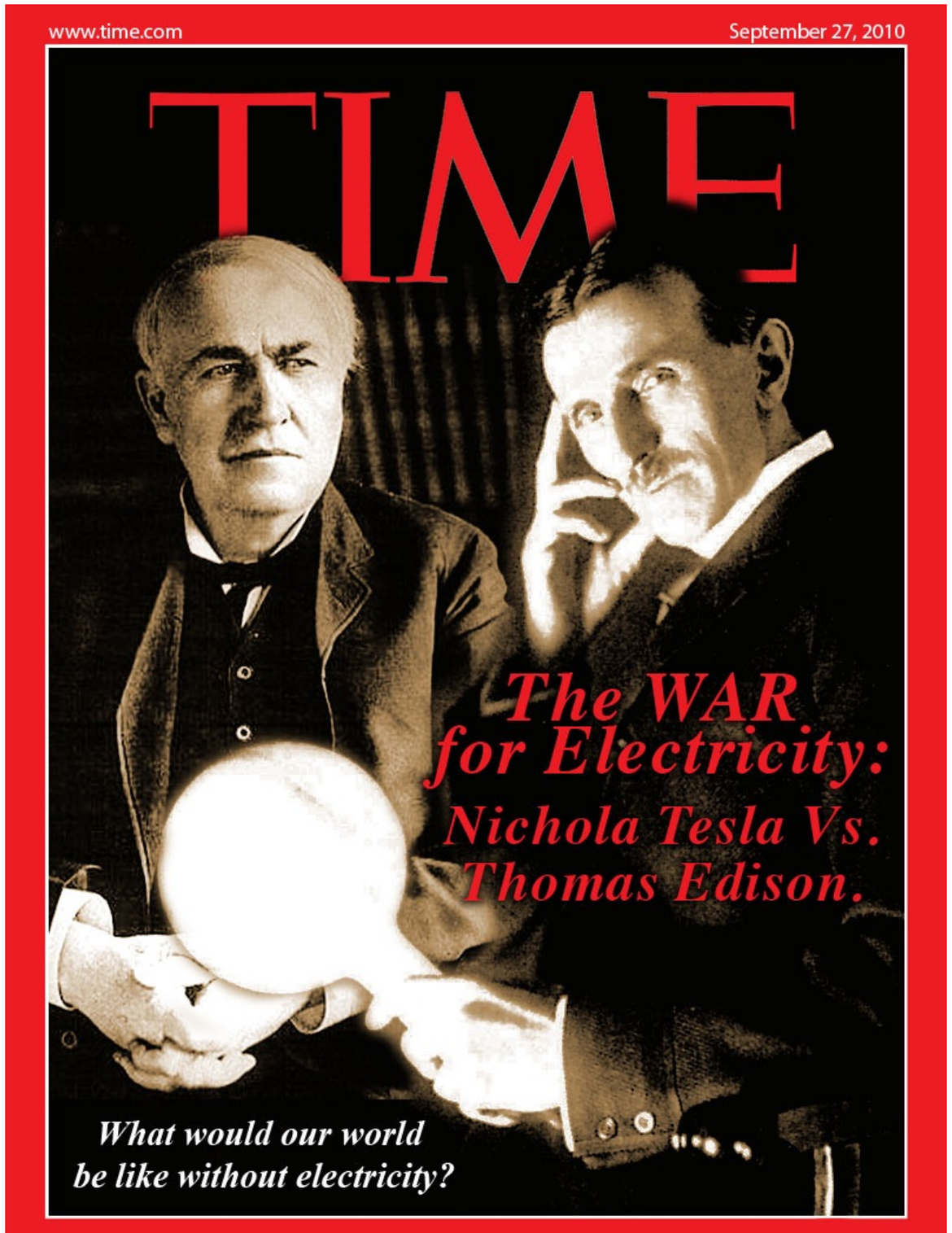


The motion of the electric charge periodically reverses direction. That is, charges simply wiggle back and forth and don’t travel anywhere.

AC is the form in which electric power is delivered to businesses and residences. The usual waveform of an AC source is a sine wave.

In certain applications, different waveforms are used, such as triangular (sound synthesis) or square waves (switching electronics).

The battle for supremacy on using DC or AC for delivering energy to homes and businesses was waged in the 1880s.



The DC system generated and distributed electric power at the same voltage as used by customer. This meant costly distribution wires and forced generating plants to be near the loads (people's homes).

AC generating stations could be larger, cheaper to operate, and the distribution wires were relatively less costly.

With the invention of the transformer, AC systems had the advantage of easily changing the voltage of the power. Energy companies could save lots of money by using very high voltages to transmit energy over long distances.

Due to the significant advantages of AC over DC in transforming and transmission, electric energy distribution is nearly all alternating current today.