



History of Electricity

Starting with Ben

Many people think Benjamin Franklin discovered electricity with his famous kite-flying experiments in 1752. Franklin is famous for tying a key to a kite string during a thunderstorm, proving that static electricity and lightning were indeed, the same thing. However, that isn't the whole story of electricity. Electricity was not "discovered" all at once.

Electricity is an action—not really a thing—so different forms of electricity had been known in nature for a long time. Lightning and static electricity were two forms.

In the early years, electricity became associated with light. After all, electricity lights up the sky during a thunderstorm. Likewise, static electricity creates tiny, fiery sparks. People wanted a cheap and safe way to light their homes, and scientists thought electricity could do it.

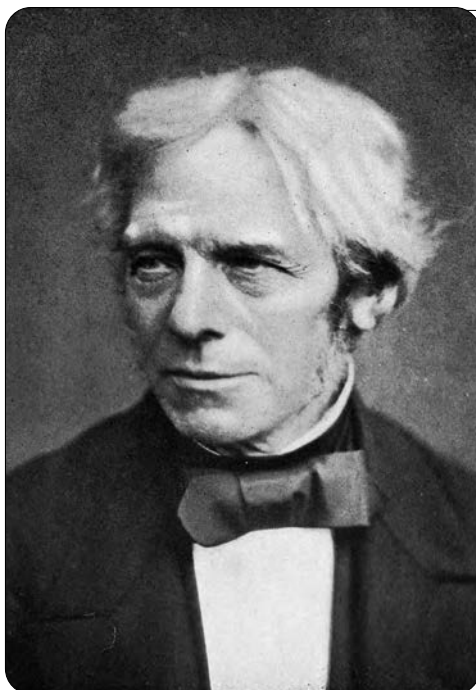
A Different Kind of Power: The Battery

The road to developing a practical use of electricity was a long one. Until 1800, there was no dependable source of electricity for experiments. It was in this year that an Italian scientist named Alessandro Volta soaked some paper in salt water, placed zinc and copper on alternate sides of the paper, and watched the chemical reaction produce an electric current. Volta had created the first electric cell.

By connecting many of these cells together, Volta was able to "string a current" and create a **battery**. (It is in honor of Volta that we rate batteries in **volts**.) Finally, a safe and dependable source of electricity was available, making it easy for scientists to study electricity. The electric age was just around the corner!

A Current Began

English scientist Michael Faraday was the first to realize that an electric current could be produced by passing a magnet through copper wiring. Both the electric generator and the electric motor are based on this principle. A generator converts motion energy into electricity. A motor converts electrical energy into motion.



Michael Faraday

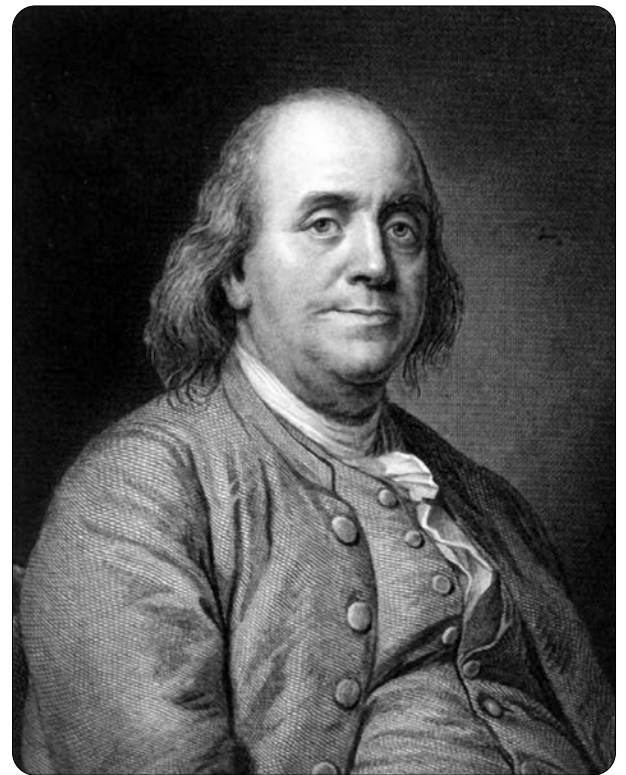


Image courtesy of NOAA Photo Library

Benjamin Franklin



Image courtesy of Teylers Museum

Alessandro Volta

Mr. Edison and His Light

In 1879, Thomas Edison focused on inventing a practical light bulb, one that would last a long time before burning out. The challenge was finding a strong material to be used as the **filament**, the small wire inside the bulb that conducts the electricity.

Finally, Edison used ordinary cotton thread that had been soaked in carbon. The filament did not burn—instead, it became **incandescent**; that is, it glowed. These new lights were battery-powered, though, and expensive.

The next obstacle was developing an electrical system that could provide people with a practical, inexpensive source of energy. Edison went about looking for ways to make electricity both practical and inexpensive. He engineered the first electric power plant that was able to carry electricity to people's homes.

Edison's Pearl Street Power Station started up its generator on September 4, 1882, in New York City. About 85 customers in lower Manhattan received enough power to light 5,000 lamps. His customers paid a lot for their electricity. In today's dollars, the electricity cost \$5 per kilowatt-hour! Today's electricity costs about 15 cents per kilowatt-hour.

The Question: AC or DC?

The turning point of the electric age came a few years later with the development of **AC (alternating current)** power systems. Croatian-born scientist Nikola Tesla came to the United States to work with Thomas Edison. After a falling out, Tesla discovered the rotating magnetic field and created the alternating current electrical system that is used very widely today. Tesla teamed up with engineer and businessman George Westinghouse to patent the AC system and provide the nation with power that could travel long distances — a direct competition with Thomas Edison's DC system. Tesla later went on to form the Tesla Electric Company, invent the Tesla Coil, which is still used in science labs and in radio technology today, and design the system used to generate electricity at Niagara Falls.

Now using AC, power plants could transport electricity much farther than before. While Edison's **DC (direct current)** plant could only transport electricity within one square mile of his Pearl Street Power Station, the Niagara Falls plant was able to transport electricity over 200 miles!

Electricity didn't have an easy beginning. While many people were thrilled with all the new inventions, some people were afraid of electricity and wary of bringing it into their homes. They were afraid to let their children near this strange new power source. Many social critics of the day saw electricity as an end to a simpler, less hectic way of life. Poets commented that electric lights were less romantic than gaslights. Perhaps they were right, but the new electric age could not be dimmed.

In 1920, about two percent of U.S. energy was used to make electricity. In 2022, with the increasing use of technologies powered by electricity, it was about 35 percent.

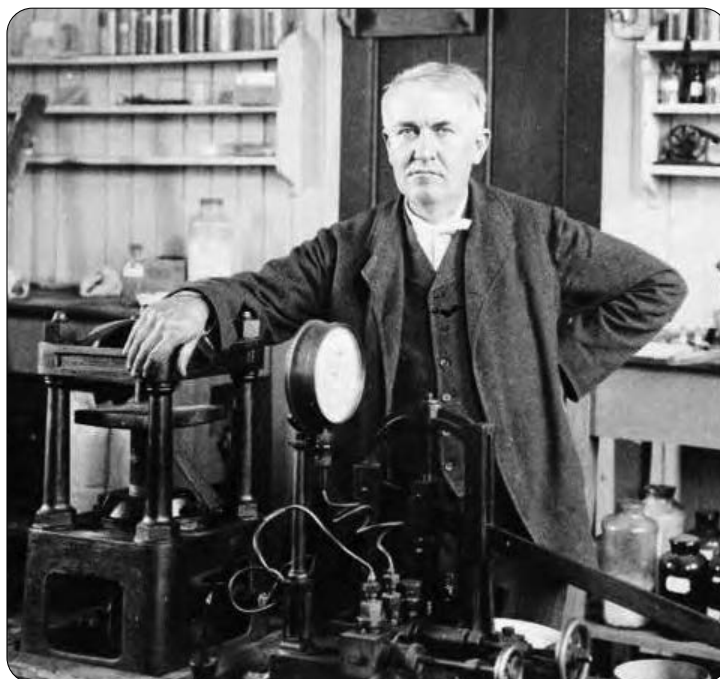


Image courtesy of U.S. Library of Congress

Thomas Edison in his lab in 1901.

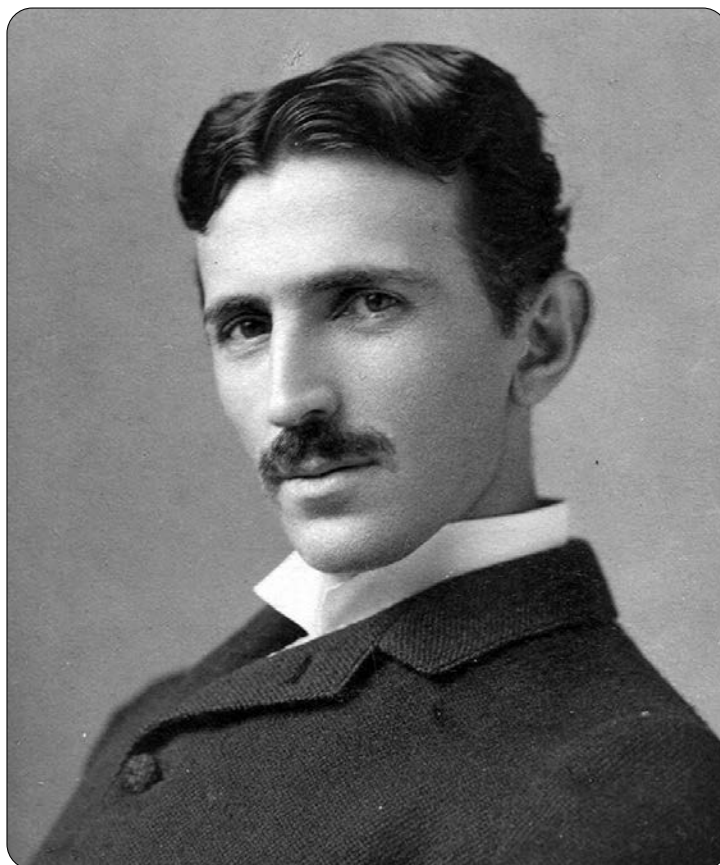


Photo by Napoleon Sarony

Nikola Tesla