

History of Electricity and Transmission

Objective:

Students will understand the history of electricity and research the history of local transmission processes.

Materials and Curriculum
Correlations ▼

► Introduction

As early as 600 BC, ancient Greeks discovered static electricity. In the 1600s, the term electricity was coined from elektron, the Greek word for amber. We have progressed from understanding static electricity to transmitting electricity to millions of people via the grid. The history of electricity is a who's who of famous scientists and important advances in technology. How does electricity affect our lives? Where will the future take us?

Procedure

1. Divide students into five groups. Give each group one page of the "Electricity Timeline." Give students about 10 minutes to discuss their information and organize how they will share with the class. End the group discussions and have each group share their information with the class.
2. Have students reassemble in their groups. Have each group make a 30 second video about one of the ways they use electricity. Have groups share their videos.
3. This timeline purposefully ends at 2001. Have students research significant events or inventions that have been made since 2001. Have groups discuss their choices and decide which events or inventions should make the timeline.
4. Direct students to research the timeline of the electricity generation in their city, town or local area. What was the date electricity was first supplied to the area? Was it in a residential, commercial or government building or an industrial area? When was the first high voltage transmission line put into service in your area? First substation? Any other event of significance?

To Know and Do More

1. Have students research a scientist from “Electricity Timeline” and the event or invention listed. Determine if the scientist was involved with other inventions or discoveries besides those listed. Create a presentation to give to other students.
2. Direct students to write a short paragraph about their energy use if they lived 300 years ago.

Materials Needed:

- Student sheet
 - Paper
- Markers
 - Internet

Curriculum Correlations

K.RI.3	3.SL.1	HS-W.2
K.SL.1	4.RI.6	HS-SL.1
1.RI.3	4.RF.4	2.b
1.W.3	4.W.2	2.c
1.SL.1	4.SL.1	2.f
2.RI.3	5.RI.6	3.k
2.W.3	5.RF.4	7.a
2.SL.1	5.W.2	8.a
3.RI.6	5.SL.1	8.b
3.RF.4	MS-W.2	10.j
3.W.2	MS-SL.1	

Electricity Timeline

Around 600 BC	Thales (Greece) found that when amber was rubbed with silk, it became electricly charged and attracted objects. He had discovered static electricity.
1600	William Gilbert (England) first coined the term electricity from elektron, the Greek word for amber. Gilbert wrote about the electrification of many substances. He was also the first person to use the terms electric force, magnetic pole and electric attraction.
1660	Otto von Guericke (Germany) described and demonstrated a vacuum and then invented a machine that produced static electricity. Robert Boyle (Ireland) discovered that electric force could be transmitted through a vacuum and observed attraction and repulsion.
1675	Stephen Gray (England) distinguished between conductors and nonconductors of electric charges.
1745-46	Georg von Kleist (Germany) developed the first electric capacitor, a device for storing electricity. Pieter van Musschenbroek (Netherlands) independently developed an electric capacitor that would be called the Leiden jar after the University of Leiden where he worked.
1752	Ben Franklin (United States) tied a key to a kite string during a thunderstorm and proved that static electricity and lightning are the same thing.
1800	Alessandro Volta (Italy) invented the first electric battery. The term Volt is named in his honor.
1808	Sir Humphry Davy (England) invented the first effective lamp. The arc lamp was a piece of carbon that glowed when connected by wires to a battery.
1820	Separate experiments by Hans Christian Oersted (Denmark), Andre-Marie Ampere (France) and Francois Arago (France) confirmed the relationship between electricity and magnetism.
1821	Michael Faraday (England) discovered the principle of electromagnetic rotation that would later be the key to developing the electric motor.
1826	Georg Ohm (Germany) defined the relationship between power, voltage, current and resistance in Ohm's Law.
1831	Using his invention the induction ring, Michael Faraday (England) proved that electricity can be induced (made) by changes in an electromagnetic field. Faraday's experiments about how electric current works led to the understanding of electric transformers and motors. Joseph Henry (United States) separately discovered the principle of electromagnetic induction but did not publish his work. He also described an electric motor.

1832	Using Faraday's principles, Hippolyte Pixii (France) built the first dynamo, an electric generator capable of delivering power for industry. Pixii's dynamo used a crank to rotate a magnet around a piece of iron wrapped with wire.
1835	Joseph Henry (United States) invented the electric relay, which could send electric currents long distances.
1837	Thomas Davenport (United States) invented the electric motor, an invention that is used in most electric appliances today.
1839	Sir William Robert Grove (Scotland) developed the first fuel cell, a device that produces electric energy by combining hydrogen and oxygen.
1841	James Prescott Joule (England) showed that energy is conserved in electric circuits involving current flow, thermal heating and chemical transformations. A unit of thermal energy, the Joule, was named after him.
1844	Samuel Morse (United States) invented the electric telegraph, a machine that could send messages long distances across wires.
1860s	The mathematical theory of electromagnetic fields was published. J.C. Maxwell (Scotland) created a new era of physics when he unified magnetism, electricity and light. Maxwell's four laws of electrodynamics (Maxwell's Equations) eventually led to electric power, radios and television.
1876	Charles Brush (United States) invented the open coil dynamo (or generator) that could produce a steady current of electricity.
1878	Joseph Swan (England) invented the first incandescent light bulb (also called an electric lamp). His light bulb burned out quickly. Charles Brush (United States) developed an arc lamp that could be powered by a generator. Thomas Edison (United States) founded the Edison Electric Light Co. in New York City. He bought a number of patents related to electric lighting and began experiments to develop a practical, long-lasting light bulb.
1879	After many experiments, Thomas Edison (United States) invented an incandescent light bulb that could be used for about 40 hours without burning out. By 1880, his bulbs could be used for 1,200 hours. Electric lights (Brush arc lamps) were first used for public street lighting in Cleveland, Ohio. California Electric Light Company, Inc., in San Francisco, was the first electric company to sell electricity to customers. The company used two small Brush generators to power 21 Brush arc light lamps.
1881	The electric streetcar was invented by E.W. von Siemens.
1882	Thomas Edison (United States) opened the Pearl Street Station in New York City. The power station was one of the world's first central electric power plants and could power 5,000 lights. It used a direct current (DC) power system, unlike the power systems that we use today which use alternating current (AC). The first hydroelectric station opened in Wisconsin. Edward Johnson first put electric lights on a Christmas tree.
1883	Nikola Tesla (U.S. immigrant from Austrian empire) invented the Tesla coil, a transformer that changed electricity from low voltage to high voltage, making it easier to transport over long distances.

1884	Nikola Tesla (U.S. immigrant from Austrian empire) invented the electric alternator for producing alternating current (AC). Until this time, electricity had been generated using direct current (DC) from batteries. Sir Charles Algernon Parsons (England) invented a steam turbine generator, capable of generating huge amounts of electricity.
1886	William Stanley Jr. (United States) developed the induction coil transformer and an alternating current (AC) electric system.
1888	Nikola Tesla (U.S. immigrant from Austrian empire) demonstrated the first polyphase alternating current (AC) electric system. His AC system included all units needed for electricity production and use: generator, transformers, transmission system, motor (used in appliances) and lights. George Westinghouse, the head of Westinghouse Electric Company, bought the patent rights to the AC system. Charles Brush (United States) was the first to use a large windmill to generate electricity. He used the windmill to charge batteries in the cellar of his home in Cleveland, Ohio.
1893	The Westinghouse Electric Company used an alternating current (AC) system to light the Chicago World's Fair. A 22 mile AC power line was opened, sending electricity from Folsom Powerhouse to Sacramento (both in California).
1895-96	The Niagara Falls hydropower station opened. It originally provided electricity to the local area. One year later, when a new alternating current (AC) power line was opened, electric power from Niagara Falls was sent to customers over 20 miles away in Buffalo, New York.
1897	Joseph John Thomson (England) discovered the electron.
1901	The first power line between the United States and Canada was opened at Niagara Falls.
1903	The world's first all turbine station opened in Chicago. The world's largest generator (5,000 Watts) was opened at Shawinigan Water & Power. The world's largest and highest voltage line (136 kilometers and 50 kilovolts) brought power to Montreal.
1908	J. Spangler (United States) invented the first electric vacuum cleaner.
1909	The world's first pumped storage plant opened in Switzerland.
1911	W. Carrier (United States) invented electric air-conditioning.
1913	Thomas Edward Murray (United States) created the first air pollution control device, the cinder catcher. Arnold Goss (United States) invented the electric refrigerator.
1920	The Federal Power Commission (FPC) was established for licensing hydroelectric projects.
1921	Lakeside Power Plant, in Wisconsin, became the world's first power plant to burn only pulverized coal.
1922	Connecticut Valley Power Exchange (CONVEX) started pioneering interconnection between utilities.
1933	The Tennessee Valley Authority (TVA) was created. It was the first federal power authority and was designed to provide regional power.

1935	Some of the New Deal legislation passed during the Roosevelt administration was designed to regulate public utilities and to bring electricity to rural America. The Public Utility Holding Company Act of 1935 was designed to break up powerful holding companies that had bought up many smaller electric companies. The Federal Power Act of 1935 regulates utilities that transmit and sell power across state lines.
1936	Boulder (later renamed Hoover) Dam was completed. A 287 kilovolt power line stretched 266 miles from the dam in Boulder City, Nevada, to Los Angeles, California. The Rural Electrification Act of 1936 aimed at bringing electricity to farms across the country.
1937	The Bonneville Power project, a federal power marketing authority, was created.
1942	Owing to rural electrification, almost half of American farms had electricity, compared with 11 percent in 1932.
1946	The first general purpose electronic digital computer, the ENIAC (Electronic Numerical Integrator and Computer), was completed.
1947	Scientists at Bell Telephone Laboratories invented the transistor.
1950	Almost all American farms had electricity. John Hopps (Canada) discovered that if a heart stopped beating due to cooling, it could be started again by artificial stimulation using mechanical or electric means. This led to his invention of the world's first cardiac pacemaker.
1951	Charles Ginsburg (United States) invented the first videotape recorder (VTR). UNIVAC was the first commercially produced electronic digital computer in the United States.
1954	The world's first nuclear power plant (Russia) started generating electricity. The Atomic Energy Act of 1954 was passed. It allowed private ownership of nuclear reactors. Chaplin, Fuller and Pearson (United States) working for Bell Labs, invented the first solar cell.
1957	The Shippingport reactor in Pennsylvania was the first nuclear power plant to provide electricity to customers in the United States.
1958	The first commercial modem was developed.
1961	The first electronic desktop calculators were the ANITA Mark VII and Mark VIII which used vacuum tube technology.
1962	The Communications Satellite Act of 1962 encouraged the development of satellite communications. Steve Russell (United States) invented Spacewar, the first game intended for computer use.
1963	The U.S. and the former Union of Soviet Socialist Republics (USSR) agreed to establish a direct communications link.
1964	International Business Machines Corporation (now IBM) used light emitting diodes (LEDs) on circuit boards in an early mainframe computer.
1972	The arcade game Pong was created.

1973	The first personal computer was developed. Dr. Martin Cooper (United States) invented the first portable handset phone. Robert S. Ledley (United States) was granted a patent for a diagnostic X-ray system, computerized axial tomography (also known as the CT Scan or CAT Scan).
1976	The first commercial fiber optic cable was installed in Chicago for telephone signals.
1981	The Osborne 1 computer, considered by many to be the first true portable computer, was created by Adam Osborne (United States).
1990s	Advances in LED technology led to the development of white LEDs. The first PDAs, or personal digital assistants, were developed.
1998	Computer and electronics companies cooperated to develop Bluetooth technology that allows wireless communication between mobile phones, laptops, PCs, printers, digital cameras and video game consoles.
2001	The iPod, a portable media player, was launched by the Apple Corporation.