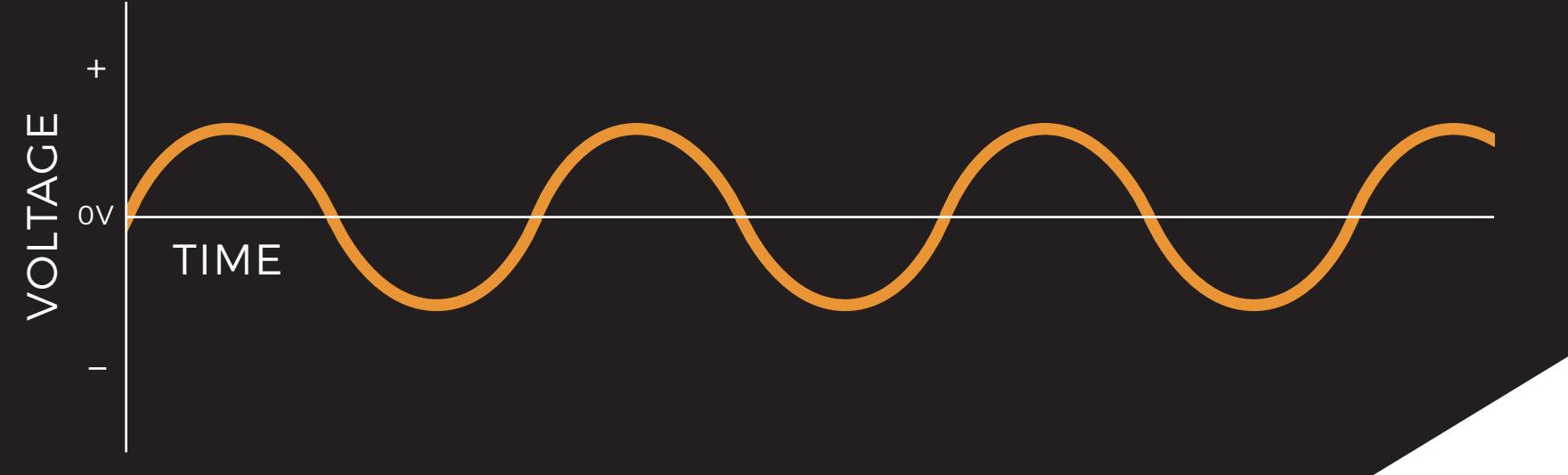


## NIKOLA TESLA

"The Man who Invented the 20th Century"

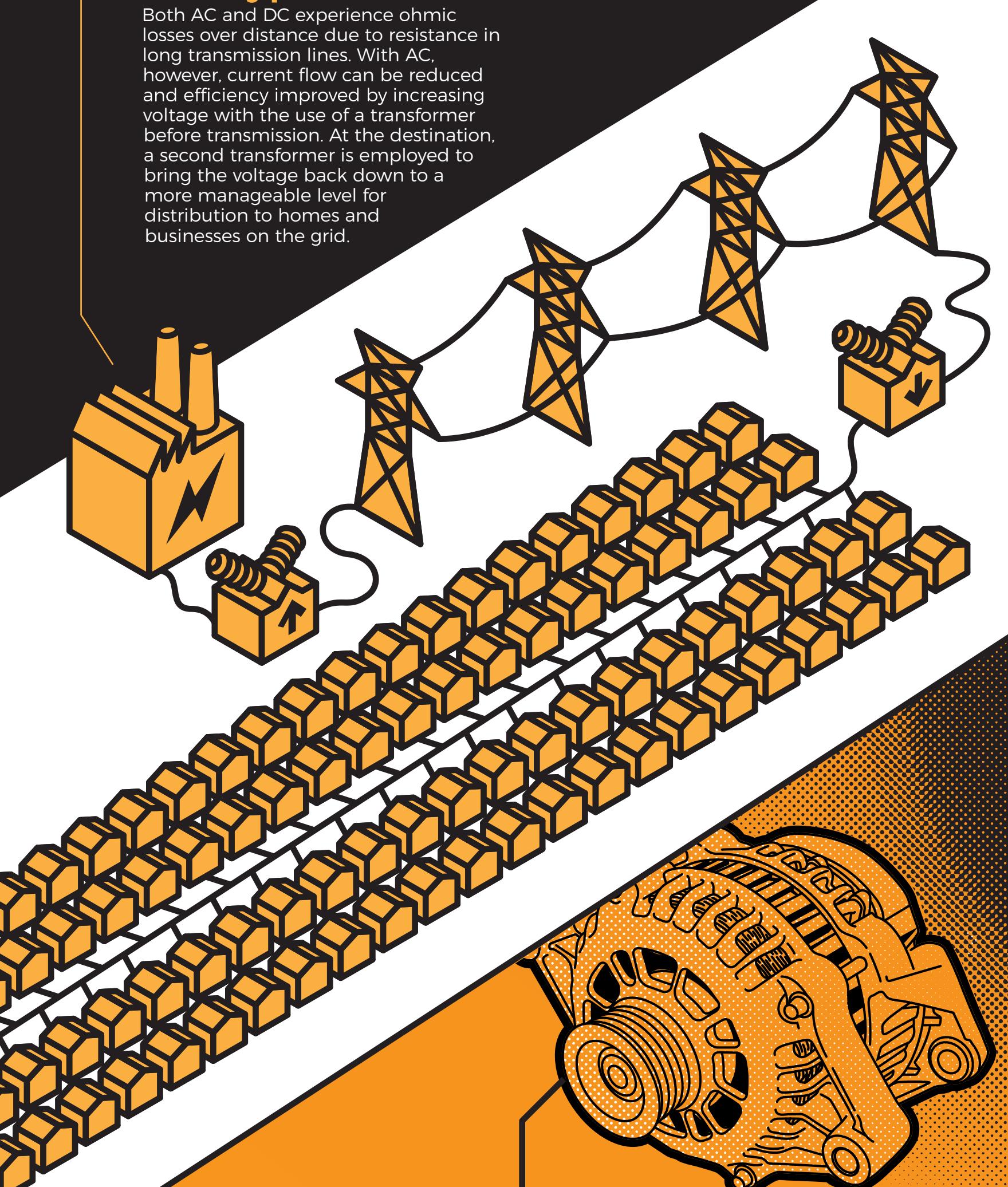
## ALTERNATING CURRENT

Alternating current, or "AC," reverses direction periodically, its voltage oscillating between positive and negative at a rate of 50 to 60 times per second.



### A Polyphase AC Power Grid

Both AC and DC experience ohmic losses over distance due to resistance in long transmission lines. With AC, however, current flow can be reduced and efficiency improved by increasing voltage with the use of a transformer before transmission. At the destination, a second transformer is employed to bring the voltage back down to a more manageable level for distribution to homes and businesses on the grid.



### AC in the Wild

Most modern cars use an AC alternator to transform the kinetic energy created by the internal-combustion engine into electrical energy that can be easily stored for later use in its batteries.

### AC Pros and Cons

AC motors are powerful.  
Efficient power transmission over great distances.  
Low maintenance, high life-expectancy.

Typically more expensive.  
Power transmission requires dangerously high voltages and transformers.  
Difficult to regulate for delicate circuits.

## CURRENT EVENTS

Two inventors, both alike in ability,  
in fair New Jersey where  
we lay our scene.  
From current grudge  
break to new scrutiny,  
where legal pride makes  
legal patents unclean.  
From forth the fertile  
minds of these two bros,  
a pair of star-cross'd  
innovators make their lives.  
For never was a story of more fun  
than this of Tesla  
and Thomas Edison.

**1856**

Nikola Tesla is born in what is now Croatia, some say during a lightning storm.<sup>17</sup>

**1866**

At 15, Thomas Edison is hired as a traveling telegrapher.<sup>18</sup>

**1868**

Edison files his first U.S. patent – an electric voting recorder.<sup>19</sup>

**1882**

Edison flips the switch on Manhattan's first steam-powered DC generators at 257 Pearl Street.<sup>20</sup>

**1884**

Edison hires Tesla, offering him \$50,000 to make improvements to his DC power plants.<sup>3</sup>

**1885**

Tesla tells Edison his improvements to the DC generators are complete. Edison refuses to pay him, suggesting he learn to appreciate American humor. Tesla, unamused, quits.<sup>4</sup>

**1887**

Tesla files seven U.S. patents for AC systems including generators, motors, transformers, transmission lines and arc lighting.<sup>14</sup>

**1887**

With the future of the modern power grid in the balance, the "War of the Currents" begins between Westinghouse and Edison.<sup>11</sup>

**1888**

Westinghouse purchases Tesla's patents for \$5,000 in cash, \$50,000 in shares of stock, and royalties amounting to \$2.50 per "horsepower of electrical capacity".<sup>5</sup>

**1890**

A professor Harold Brown, allegedly in the employ of Edison, uses a Westinghouse AC generator to execute convicted murderer William Kemmler. According to Westinghouse, Brown is also demonstrating the dangers of AC on dogs and horses.<sup>11</sup>

**1891**

Edison founds the Edison General Electric - later to become General Electric.<sup>1</sup>

**1893**

Tesla and Westinghouse win the bid to provide power to the Chicago World's Fair. They use 12 massive, 1,000-horsepower AC generators to do it. The demonstration is a winning stroke in the war of the currents.<sup>6</sup>

**1896**

Tesla and Westinghouse successfully harness the power of Niagara Falls, bringing hydroelectrically-generated light and power to millions and paving the way for our modern power system.<sup>12</sup>

**1897**

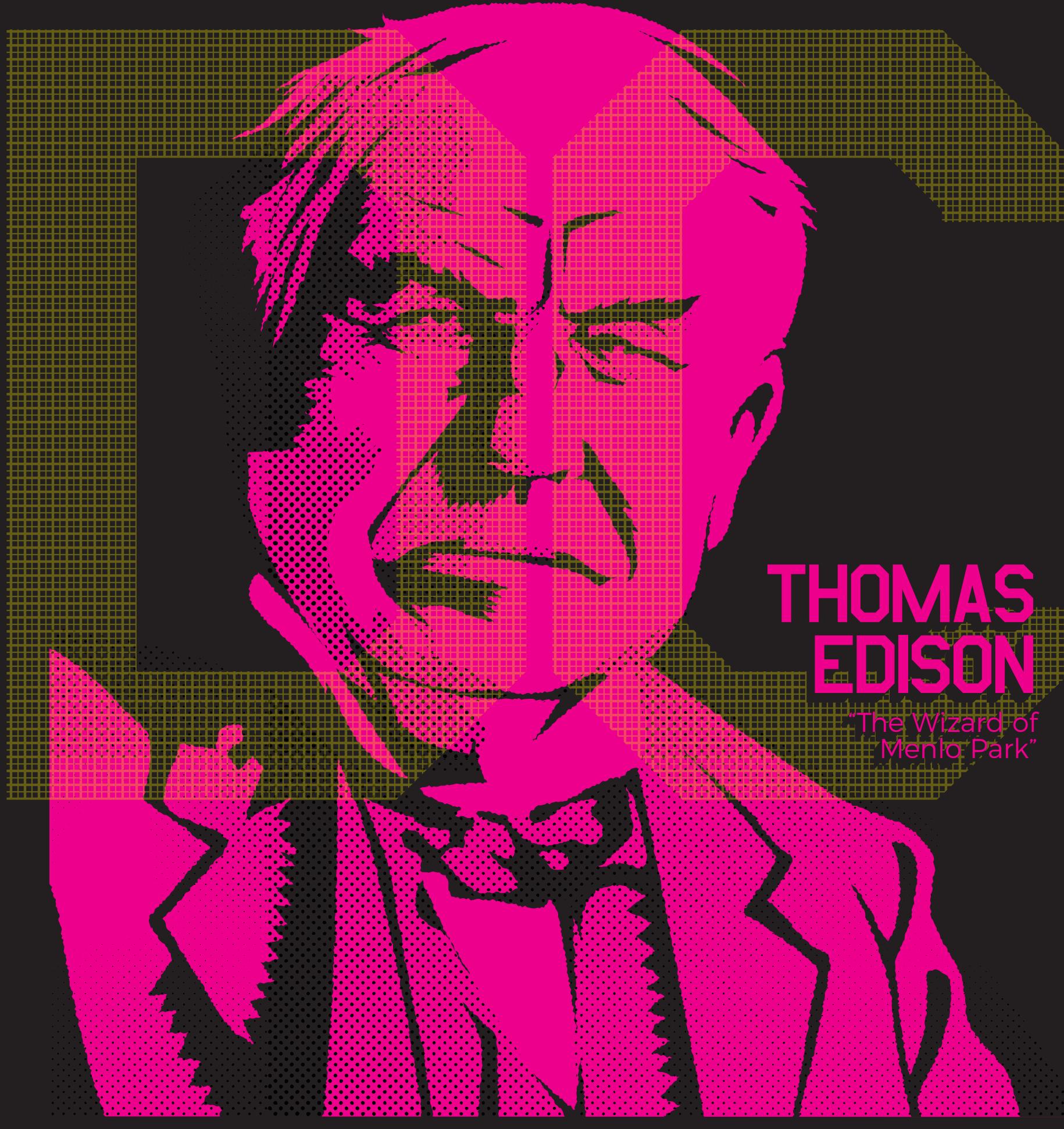
Former Niagara investor J.P. Morgan manipulates the stock market in an attempt to force Westinghouse to turn over control of U.S. hydroelectric power to him. Tesla tears up his \$2.50-per-horsepower royalties contract, saving Westinghouse but leaving himself in financial ruin.<sup>8</sup>

**1903**

Officials at Luna Park on Coney Island use a combination of methods, including alternating current, to publicly euthanize an elephant named Topsy. Edison is not involved in these decisions or proceedings, but an Edison Manufacturing Co. film crew is present to document the event.<sup>10</sup>

**1917**

Edison heads the Naval Consulting Board during WWI, designing submarine and gun detection devices. He refuses to invent weapons, citing a moral indignation to violence.<sup>9</sup>



## THOMAS EDISON

"The Wizard of Menlo Park"

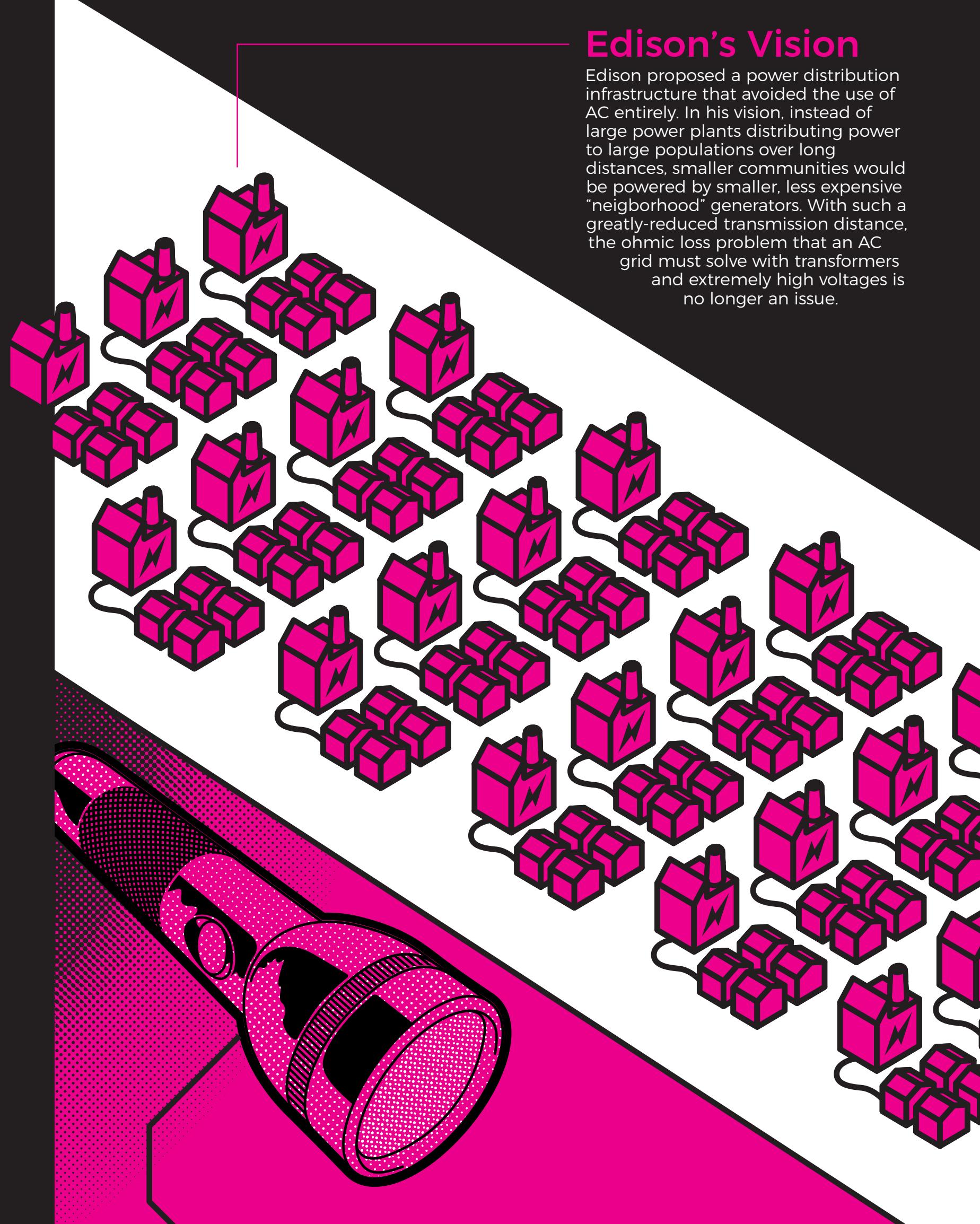
## DIRECT CURRENT

With direct current, or "DC," the direction of current is constant. The vast majority of our small electronic devices use DC to function.



### Edison's Vision

Edison proposed a power distribution infrastructure that avoided the use of AC entirely. In his vision, instead of large power plants distributing power to large populations over long distances, smaller communities would be powered by smaller, less expensive "neighborhood" generators. With such a greatly-reduced transmission distance, the ohmic loss problem that an AC grid must solve with transformers and extremely high voltages is no longer an issue.



### DC in the Wild

Inside any commercially available product that uses a battery, you will find a circuit that uses DC power.

### DC Pros and Cons

Relatively simple.  
Voltages are easier to manipulate than with AC.  
Small, portable, battery-compatible.

Often requires the support of a source of AC.  
High power loss over distance due to transmission line resistance.

