Electric Cars: History and Future

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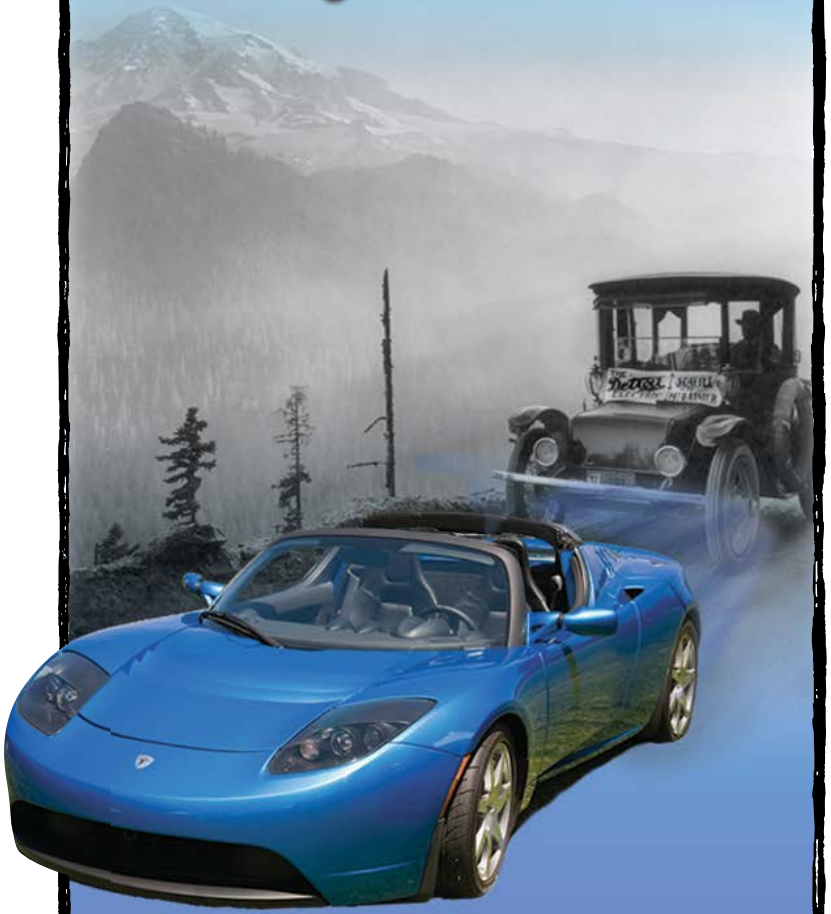
Electric Cars: History and Future



Written by Steven Accardi

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Front cover: (background) A Detroit Electric car travels from Seattle to Mt. Rainer in Washington State in 1919. (foreground) A 2008 Tesla Roadster, an all-electric high-performance sports car

Back cover: A single-passenger electric car called a Sparrow leads an Earth Day parade.

Title page: Mitsubishi's electric car called the iMiev Sport

Table of Contents: A Japanese electric vehicle maker, Axle Co., developed an electric motorcycle, the EV-X7, which can go 112 miles on one charge.

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Correlation

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Table of Contents

Teens get on a school bus in Miami, Florida.

Stuck in Traffic

You grab your lunch and your backpack, and then head out the door. Before you see it rounding the corner and turning down your street, you hear the rumble of its engine. It's the school bus. The other kids on your block are already waiting at the bus stop. You run and get in line just as the bus is pulling up.

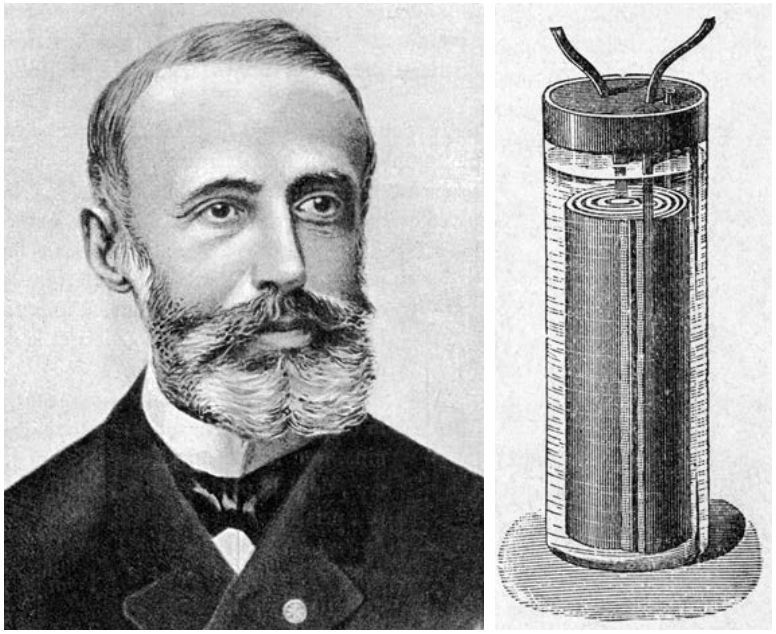
As you wait for your schoolmates to board ahead of you, you feel the heat from the **exhaust** warming your legs, and taste the fumes as they enter your nose and mouth. You finally climb aboard, find your favorite seat, and glance out the window as the bus accelerates from the curb.

It seems as though only a moment has passed before the bus stops. Taking a look out the window you begin to understand why. Cars and trucks and motorcycles are everywhere, but none of them are moving. You're in a traffic jam. The noise is so loud that you cannot hear the kid across from you. You wonder when the racket will end. Surprisingly, smelly, noisy traffic could have ended a long time ago, if the invention of the electric car had gained more popularity.

School buses make their way through traffic in Toronto, Ontario.

What Is an Electric Car?

Electric cars began their life in the 1830s with a man named Robert Anderson of Scotland. He invented the first electric carriage. A fellow Scotsman, Robert Davidson, and an American, Thomas Davenport, created electric vehicles in 1842 that used electric cells as a power source. These cells could not be recharged, which meant the power source had to be replaced often. Two Frenchmen, Gaston Planté in 1865, and Camille Faure in 1881, created and improved upon a power source that had better storage capacity and was rechargeable—the lead-acid battery.


Gaston Planté, a French physicist, and his lead-acid battery

Jenatzy, a famous race car driver, reached speeds above 100 mph (160 kph) in this electric car in 1899.

The lead-acid battery was a huge **breakthrough** and is still used in electric vehicles today. Lead-acid batteries are made using sulfuric acid and lead. When the acid eats away at the lead, a **chemical reaction** occurs and an electric charge is created. This charge powers the motor until the battery needs to be recharged. With the invention of the lead-acid battery, the popularity of electric cars increased.

Early Electric Cars

For several years, France and Great Britain led the world in the development of electric vehicles. The United States did not join in until 1891 when A. L. Ryker built an electric tricycle and William Morrison built a six-passenger electric wagon. Suddenly, America was hooked. Many early electric **prototypes** were created. In 1897, the city of New York bought a fleet of electric taxis from the Electric Carriage and Wagon Company of Philadelphia. The taxis looked almost like horse carriages, without the horse, and cost nearly $2,000 each, which would be at least $50,000 today.

A 1903 advertisement

By Steam, Electricity, or Gas

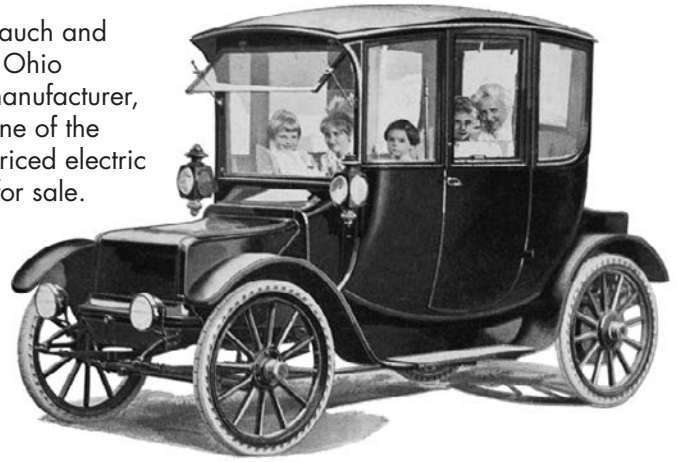
By the beginning of the twentieth century, the popularity of cars in America had increased greatly. More and more people were moving to cities and wanted greater **mobility**. Ambitious and competitive inventors responded quickly to the demand by embracing different technology and devising many new and original ways of powering vehicles. This led to the invention of cars powered by steam and gasoline, in addition to electric cars.

Sales of electric cars soared in 1899 and 1900 mainly because their competitors lacked what electric cars offered. Electric cars did not shake like gasoline cars, and their motors did not produce the **pungent** smell and loud noise that gasoline cars did. Changing gears on gasoline cars also proved to be a **nuisance**, and drivers were often seen wrestling with the gear shifter. Electric and steam vehicles did not require gears to be shifted. Steam cars, however, took a long time to start, sometimes as much as 45 minutes, especially on colder mornings. Gasoline cars also took time to start and required drivers to turn a hand crank.

Range, or the distance traveled, was a problem with these early cars—steam cars could only travel a short distance before needing more water. Electric cars had the advantage because they could travel farther than steam cars on a single charge. At that time, the best roads were in cities, which meant that most travel was local. This situation made electric cars popular because they were able to ride smoothly and quietly for short distances.

Standard electric cars cost slightly less than $1,000. Electric-vehicle manufacturers, however, wanted to reach more **prosperous** consumers and had designers create massive, ornate carriages with **flamboyant** interiors made from expensive materials, which bumped up the price to almost $3,000 by 1910. This decision on affordability would haunt the electric car for years to come.

In 1911 Rauch and Lang, an Ohio vehicle manufacturer, offered one of the highest priced electric vehicles for sale.



The Lohner Porsche 'Mixte' of 1900

Do You Know?

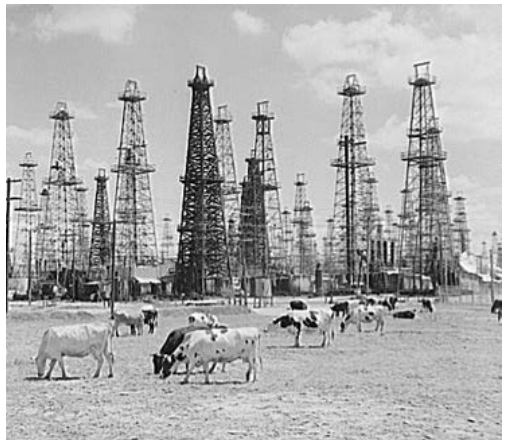
Hybrid cars were also invented a little more than a hundred years ago. A car is called a hybrid when it runs on two different sources of energy, such as electricity and gas. Ferdinand Porsche invented the first hybrid car in Germany in 1898. His design used a gasoline engine to spin generators that produced electricity, which was sent to the electric motors that powered the car.

The Decline of the Electric Car

After the initial surge in popularity of electric vehicles for short, in-town trips, the **production** and sales of electric cars dropped rapidly; but it was not just the high price tag that caused the decline.

By the 1920s, U.S. cities had expanded their road systems so that motorists could travel between cities on good roads. This change brought about the need for vehicles that could travel greater distances like the gasoline car.

An important breakthrough was the invention by Charles Kettering of the electric starter. The starter used electric power and **eliminated** the need for the troublesome hand crank gasoline cars needed to start. Around the same time, oil was discovered in Texas, which made gasoline easier and cheaper to produce and therefore, much more affordable to the average driver.



Discovery of oil in Texas meant cows began sharing fields with oil rigs.

In 1973 a gas shortage kept many cars idle and others waiting in long lines to purchase what gas was available.

Eventually, Henry Ford's assembly lines allowed the mass production of gasoline cars. Such high-volume production meant that Ford could sell his vehicles cheaply—to begin with, between $500 and $1,000. Gasoline cars became cheaper and cheaper to manufacture and sell. At one point in 1912, an electric car with its ornate designs sold for about $1,750, while a gasoline car went for about $600.

By 1935, electric vehicles were almost extinct and would not be built again until the 1960s when people learned how high a toll gasoline cars took on the **environment**. The constant release of harmful gases by vehicles prompted Americans to demand more environmentally friendly vehicles. Consumers also wanted **alternative** fuels to gasoline, and to rely, or depend, less on foreign oil.

The Resurgence

In the late 1960s, a company called Battronic created an electric truck that could carry 2,500 pounds at 25 mph. General Electric needed utility vehicles that could move short distances inside its plants and carry a considerable amount of weight. So in the mid-1970s, GE asked Battronic to manufacture 175 electric vans and 20 electric buses. Seeing that there was interest again in electric vehicles, Sebring-Vanguard built approximately 2,000 CitiCars. These electric cars could travel 55 miles on one charge and go as fast as 44 mph.


In 2002, the London Metropolitan Police used two electric cars with a range of 53 miles and a top speed of 56 mph.

The Elcar Corporation followed by building the Elcar, which went slightly faster (45 mph) and a bit farther (60 miles) than the CitiCar. In 1975, the United States Postal Service saw the potential of electric vehicles and ordered a trial of 350 electric delivery jeeps from the American Motor Company. These jeeps had a top speed of 50 mph, but could only go 40 miles before needing a charge.

In 1990 and 1992, the U.S. government passed the Clean Air Act Amendment and U.S. Energy Policy Act. In addition, a few states created policies to reduce toxic **emissions**. These laws restricted the emissions that cars could put into the atmosphere and put limits on the amount of gasoline that could be used. As a result, car companies worked together with the U.S. Department of Energy to convert some gasoline cars, like the Chevrolet S-10 pickup truck and Geo Metro, to electric cars.

Shortly thereafter, other automobile manufacturers created their own electric cars. General Motors produced the EV1, a two-passenger sports car. It could accelerate from 0 to 50 mph in less than 7 seconds, had a top speed of 80 mph, and could travel 80 miles on one charge. Other electric cars included Toyota's RAV4 sport utility vehicle, Honda's EV Plus sedan, and Chrysler's EPIC minivan.

This driver and passenger show their support for electric vehicles like the Toyota electric RAV4.

Despite all this progress, history seemed doomed to repeat itself. Much like the situation almost 100 years earlier, this new **generation** of electric cars was too expensive for the average consumer—thirty to forty thousand dollars. By improving production **methods** and increasing the volume of cars produced, car manufacturers hoped to reduce these high prices.

A Nissan Altra EV Electric Station Wagon plugs in to recharge in 1999.

Some Pluses of Electric Cars

+ Do not produce emissions like gasoline cars
+ Motors create more or less the same horsepower no matter the speed
+ Accelerate faster and more quietly than gasoline cars
+ Possible to recharge batteries using renewable sources of energy such as solar or wind power

Some Minuses of Electric Cars

– Batteries often contain toxic chemicals, which can pollute if disposed of improperly
– Some electric cars need to use special electrical sockets for recharging
– Recharging batteries can take many hours
– Most electric cars travel less than 100 miles on a single charge

This center in France recycles old car batteries.

The Future of Electric Cars

The long-term future of electric cars is very bright. Fossil fuels such as gasoline won't last forever, but electric cars will continue to work as long as we can generate electricity to run them. Although most of our electricity today comes from power plants that use coal, in the future we will need to rely more on sustainable and renewable sources of energy such as solar, wind, and hydroelectric power. Rising gasoline prices and concerns about air pollution and climate change may also increase the demand for electric cars.

Rising gas prices (top) helped hybrid cars like Toyota's Prius sedan (above) sell more than one million vehicles by 2007.

The short-term future of electric cars is still in question. Today, electric cars are not produced in the same **quantity** as gasoline cars so they are more expensive to make and purchase. Also, most electric cars can still travel less than one hundred miles on a charge. While this is farther than most people drive in a day, the thought of running out of electricity while driving still worries many people. And people who want to take their car on long trips might have to look to other forms of transportation.

Car makers have tried to address some of these issues by making **hybrid** cars, which use two sources for power. Hybrid cars use electricity as a primary power source, but also use a small gasoline motor to charge their batteries. Hybrid owners don't have to worry about running out of electricity on a trip because they can always fill up the gas tank if they need to drive farther. Some hybrid cars can even be powered by alternative fuels that come from plants, such as ethanol, vegetable oil, and biodiesel.

Mitsubishi Fuso Canter Eco Hybrid, diesel-electric

Honda FCX Concept, hydrogen fuel cell

Fuel cells are another possible source of power for electric cars. Most fuel cells create electricity by splitting hydrogen atoms and combining them with oxygen **atoms** from the air. After the electricity has been produced by this chemical reaction and used to charge a battery, the oxygen and hydrogen join together to make water—H_2O—which is all that comes out of the car's exhaust.

Ford Escape Hybrid E85, gas-electric

Fuel cells are still not practical for everyday cars. They are expensive and need lots of hydrogen, which is hard to get, **dangerous**, and difficult to store safely in a car.

(Top) 2009 Porsche Cayenne Hybrid Concept, a huge leap in technology from Porsche's original hybrid (Bottom) This team of high school students built a hybrid vehicle that gets 1,610 miles per gallon of gas.

A letter carrier rides a Segway Human Transporter as part of a test in 2002 by the U.S. Postal Service to replace some gas vehicles.

What is the future of the electric car? Will electricity for motors come from the Sun, the wind, vegetable oil, biodiesel from plants and algae, ethanol from corn or sugar cane, hydrogen from natural gas—another fossil fuel, or from a totally new source that has not yet been discovered?

The possibilities seem endless, and the energy situation is constantly changing. Next time you're stuck in traffic on your way to school, perhaps you could start thinking about new and **efficient** ways to travel that are affordable and environmentally friendly.

Glossary

alternative *(adj.)* available as a different choice or possibility (p. 13)

atoms *(n.)* the smallest units of chemical elements that can still retain the properties of those elements (p. 20)

breakthrough *(n.)* an important event or advance in knowledge that moves technology, science, medicine, etc., forward (p. 7)

chemical reaction *(n.)* a process that changes one set of chemical substances into another (p. 7)

dangerous *(adj.)* having the potential to cause harm (p. 20)

efficient *(adj.)* able to work well while producing little or no waste (p. 22)

eliminated *(v.)* removed or taken away (p. 12)

emissions *(n.)* things that are produced and given off as part of a process (p. 15)

environment *(n.)* all of the conditions affecting an organism in a specific area, including plants, animals, water, soil, weather, landforms, and air (p. 13)

exhaust *(n.)* the waste gases given off as part of a process (p. 5)

flamboyant *(adj.)* showy or fancy; brightly colored (p. 10)

generation *(n.)* types of objects that have changed in comparison to earlier versions (p. 16)

hybrid *(adj.)* made from a variety of different things; in automobiles, this often refers to the power sources (p. 19)

methods *(n.)* planned or orderly ways of doing things (p. 16)

mobility *(n.)* ability to move from place to place (p. 9)

nuisance *(n.)* an annoying person or thing (p. 9)

production *(n.)* the process of combining resources to make a product for sale (p. 12)

prosperous *(adj.)* having success; well off (p. 10)

prototypes *(n.)* original models that are used to form later things of the same type (p. 8)

pungent *(adj.)* having a sharp flavor or smell (p. 9)

quantity *(n.)* the total number or amount of something (p. 19)