

Overview

Electric vehicles, also known as EVs, have existed for almost a century. In 1900, they accounted for almost one-third of all vehicles on the road in the United States. However, when gasoline-powered combustion cars were introduced, the demand for these early EVs declined since gasoline was relatively cheap and accessible. This trend continued until the middle of the 20th century when in response to rising gas prices in the 1970s, General Motors developed a prototype for an urban electric car. GM displayed this prototype at a symposium in 1973 and kicked off a renewed interest in finding alternatives to gasoline. As people became more and more aware of the effects of greenhouse gases, EVs became increasingly popular, especially following the passage of the 1990 Clean Air Act Amendment and the 1992 Energy Policy Act. In recent years, environmental concerns from customers and businesses, government incentives for EVs, and improvements to charging infrastructure have pushed EVs into the spotlight once again. Overall, EVs are a greener alternative to traditional combustion vehicles and can be more affordable for buyers with the assistance of recent legislation signed by President Biden but still have some disadvantages that should be kept in mind.

Recent Legislation

On August 16, 2022, President Biden signed the Inflation Reduction Act (IRA) into law in an effort to control rising inflation, but sections of the act also made historic investments in programs to combat climate change. One of these investments included the expansion of tax credits for electric vehicles. Under the IRA, tax credits for electric vehicles are extended to the purchase of used vehicles and to commercial vehicles where previously credits had only been available for new customer electric vehicles. A qualifying new passenger EV is eligible for up to \$7,500, a used EV is eligible for up to \$4,000, and qualified commercial EVs are eligible for up to 30 percent of the cost of the vehicle, up to \$7,500 in the case of a vehicle that weighs less than 14,000 pounds. This is the first time tax credits are being established for commercial vehicles, and businesses that purchase commercial EVs can receive the credits until the end of 2032.

The administration's plan to provide these tax credits means that the cost of EVs could potentially decrease over time while bolstering demand. The IRA also aims to protect American manufacturers of electric vehicles by only offering tax credits for new EVs to those assembled in North America or in countries with which the U.S. has a free trade agreement.

Similar restrictions apply to the batteries and critical materials used in the production of electric vehicles in order to receive tax credits. To address the supply of these components, the IRA mandates that batteries and the critical minerals in batteries must be partially or completely extracted, processed, or recycled in North America or in countries that have free trade agreements with the U.S. The percentage of components that must meet these requirements will gradually increase, beginning with 40% for critical minerals and 50% for batteries in 2023 up to 80% for critical minerals by 2027, and 100% for batteries by 2029. This may pose a problem as many materials used for building EVs are currently produced in other countries, so American producers will be expected to meet a larger demand.

Center Forward Basics

Center Forward brings together members of Congress, not-for profits, academic experts, trade associations, corporations and unions to find common ground. Our mission: to give centrist allies the information they need to craft common sense solutions, and provide those allies the support they need to turn those ideas into results.

In order to meet our challenges we need to put aside the partisan bickering that has gridlocked Washington and come together to find common sense solutions.

For more information, please visit www.center-forward.org

In the Bipartisan Infrastructure Bill, signed into law on November 15, 2021, \$7.5 billion was set to be invested in the first-ever nationwide network of electric vehicle chargers. The Biden administration's goal is to build 500,000 chargers using these funds to make EV charging accessible for more Americans, including those in rural and underserved communities. This infrastructure will be vital to supporting the increasing number of EVs on the road.

In addition to federal legislation, California passed a rule that would ban the sale of new gasoline-powered cars by 2035. The state has set interim goals for 2026 and 2030, requiring that 35% and 68% respectively of all new passenger vehicles sold produce zero emissions.

While these new pieces of legislation set an optimistic tone, the tax credits set out by the IRA have limitations. For heavy-duty commercial vehicles, credits are capped at \$40,000, which doesn't reduce costs much when buying a vehicle of that size. Tax credits and incentives set aside for building charging stations are mainly allocated for rural and disadvantaged communities, which means urban communities might not see as many benefits. In addition, the production of EVs, particularly commercial EVs, is not yet ready to meet the demand that the tax credits create. Without these vehicles being available, consumers and businesses aren't able to take advantage of the tax credits outlined in recent legislation.

Advantages of Electric Vehicles

The most obvious advantage of electric vehicles, when compared to conventional vehicles, is that EVs do not emit greenhouse gases during use. Using one gallon of gasoline in a traditional combustion car engine releases 8,887 grams of CO₂ into the atmosphere. Over the course of a year, the average conventional gasoline vehicle will produce 4.6 metric tons of CO₂. The transportation sector is responsible for most American annual emissions, and light-duty vehicles, including passenger cars, make up the majority of transportation emissions at 57%. Instead of utilizing gasoline and producing this amount of emissions, EVs can be powered by electricity from a variety of sources, including renewable forms of energy like wind power, solar power, nuclear power, and hydropower, or by nonrenewable sources such as natural gas and coal. Charging an EV on an average American electricity grid, even if the electricity is produced partially using fossil fuels, makes these vehicles much greener than other cars. By using electricity rather than gasoline, dependence on foreign petroleum is reduced, and owners of EVs can support American producers of electricity.

Powering an EV typically costs less than powering a conventional vehicle. A 2018 study found that on average, it costs \$1,117 to power a conventional gasoline-powered vehicle in comparison to \$485 for an EV. Another study conducted in 2020 showed that the owners of EVs typically spend 60% less on fuel and power than owners of conventional vehicles. Federal and state tax credits, like the ones in the IRA, can also help lower costs for owners of EVs. Depending on the type of electricity used to power the vehicle, EVs can have longer lifespans than conventional vehicles. This, combined with the fact that batteries in EVs can last 12-15 years in moderate climates, means that EVs often require fewer repairs and can last longer for a customer or a business than a combustion vehicle, greatly reducing costs in the long run.

Another advantage of EVs is that charging an EV can be more convenient and slightly more accessible than going to a gas station with a conventional vehicle. Consumers who have purchased an electric vehicle can install chargers at home, which allows them to charge their car whenever they want without having to make trips to gas stations. In general, charging stations are easier to establish than gas stations, as they can be installed in pre-existing parking lots, garages, homes, and businesses. This then makes it easier to expand the infrastructure to support EVs as more and more of these vehicles appear on the road. Through the IRA, the government renewed, extended, and improved tax credits for building chargers in homes and businesses. Businesses can have up to 30% of the cost of installing a charger covered, up to \$100,000, through 2032, thereby making it easier and cheaper to make the switch to electric commercial vehicles.

Disadvantages of Electric Vehicles

While electric vehicles have many advantages, their disadvantages should also be considered. Firstly, powering EVs can be cheaper than conventional vehicles, but the upfront costs are usually steeper than conventional vehicles. As of the summer of 2021, the average cost of a new passenger EV was close to \$60,000 before rebates and tax credits. Compared to the cost of a

new commercial diesel medium- or heavy-duty vehicle, the price of a new commercial EV could be as much as double its diesel counterpart. Installing a charger at home or at a place of business can cause electricity bills to rise, although these costs are dependent on region. The costs can even out over the lifetime of an electric vehicle, but the high upfront cost of purchasing one of these vehicles can prevent consumers and businesses from being able to afford one.

A second disadvantage comes from the limited driving range of EVs and the limited charging infrastructure. Many EVs have driving ranges above 200 miles, but the range is dependent on speed, temperature, and traffic conditions. In addition, the driving range could decrease if the battery capacity of the vehicle begins to diminish. The average American drives less than 100 miles per day, which is well within a standard driving range for an EV, so people can go about their day and then charge their car overnight at home. However, the driving range becomes an issue for longer trips, such as driving commercial vehicles for deliveries. If chargers are not widely available in parts of the country, the use of EVs is not practical or safe because they cannot get enough charge to finish a journey. Recharge points can also create strain on the electric grid, although this problem can be mitigated with careful management. The Biden administration included investments in the IRA to update and expand the charging infrastructure, but it may take years to see real changes.

The third and final disadvantage focuses on the materials used to make EVs. Lithium is a metal that is used to build batteries for EVs. There is enough of the material to keep up with demand right now, but there might not be enough supply to keep up with rising demand in the future. The US has limited reserves of lithium, given that the country only has one lithium mine, in Nevada, that produces less than 2% of the annual lithium supply; most of the world's lithium reserves are in China while Australia produces the most, and Chile is third in both reserves and production capacity. Production of lithium batteries for EVs tends to happen in China. What lithium is available in the US comes from mines that are being protested by indigenous peoples and local farmers since this mining creates large amounts of groundwater pollution and waste. Given the downsides of using lithium in EVs, automakers are working on variations of battery chemistry to reduce costs, reduce pollution, and shift the supply away from foreign countries. However, federal R&D tax credits are not being expanded, which does not provide much incentive for further innovation or continued build-out.

Some of the other materials that affect the production of EVs are plastics and similar evolving chemistries. Improvements with batteries, plastics, and other chemistries are often delayed by EPA regulations and a slow approval process. Chemistry and plastics are used to create a variety of solutions and innovative materials for EVs that help make vehicle parts more lightweight and are also used to build electric charging stations. Plastic and polymer composite materials are used in EV battery enclosures, housing, connectors, wiring, and many more components. Said composites are selected by automakers for these applications due to their durability, light weight, and resistance to conductivity and heat. Advanced plastics and polymer composites are the materials automakers can rely on to push the boundaries of their designs, and without approval from the EPA or other forms of federal support, these newly developed technologies cannot be used to improve EVs.

Future of the Industry

The market for electric vehicles is growing rapidly, especially as the administration passes legislation to encourage it. Most, if not all, major automakers are investing in research and development to adapt to the changing market and innovating to respond to customers' needs. Many are even making pledges to halt the manufacturing of combustion vehicles in the future. As these vehicles become cheaper with assistance from the government in the form of tax credits, businesses are turning to EVs for their commercial fleets and consumers are looking for electric passenger vehicles. For example, Anheuser-Busch is deploying 21 BYD battery electric trucks in their California fleet, which will be one of the largest Class 8 electric truck deployments in North America. The infrastructure to support these vehicles needs to be expanded to keep up with the increasing number of them on the road, which will require billions of dollars of investment, but once it's in place, the switch from combustion to electric vehicles will be much easier.

And the industry is even moving beyond passenger and commercial vehicles. Airlines such as United are developing electric-powered aircraft and have made commitments to reach net zero emissions by 2050 without the use of traditional offsets. Further research needs to be done to make batteries suitable for longer flights, but electric flying taxis for urban

commutes could appear as early as 2026.

This shift towards electric vehicles is driven by a variety of factors, including but not limited to federal regulations and incentives, environmental concerns, and consumer preference. EVs are a rapidly growing sector and will continue to play a large role in the auto industry for years to come.

Links to Other Resources

- American Chemistry Council - [Advanced Plastics & Polymer Composites](#)
- Anheuser-Busch - [Anheuser-Busch to Deploy 21 BYD Electric Trucks as Part of State-Wide Commitment to Sustainable Logistics](#)
- Department of Energy - [The History of the Electric Car](#)
- Environmental Protection Agency (EPA) - [Greenhouse Gas Emissions from a Typical Passenger Vehicle](#)
- Federal Highway Administration - [President Biden, USDOT and USDOE Announce \\$5 Billion Over Five Years for National EV Charging Network](#)
- Forbes - [Inflation Reduction Act Benefits: Electric Vehicle Tax Incentives For Consumers and U.S. Automakers](#)
- JD Power - [The Future of EVs](#)
- Kelley Blue Book - [EV Sales Growing, but Price, Range Hold Some Shoppers Back](#)
- Natural Resources Defense Council - [Electric vs. Gas Cars: Is It Cheaper to Drive an EV?](#)
- New York Times - [California to Ban the Sale of New Gasoline Cars](#)
- New York Times - [How Green Are Electric Vehicles?](#)
- New York Times - [The Lithium Gold Rush: Inside the Race to Power Electric Vehicles](#)
- United Airlines - [United Invests Another \\$15 Million in Electric Flying Taxi Market with Eve](#)