

DRIVING OUR CLIMATE FORWARD

Climate Change Law, Research & Writing (Spring 2025): Final Paper

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I. Introduction

In 2025, electric vehicles are seen on roadways around the world, and especially in the United States. According to ourworldindata.org, one in four new cars sold in 2023 were electric.¹ Most people today understand, or at least assume, that using electricity to power a car is more sustainable than gasoline or diesel vehicles. This paper argues that while electric vehicles may help reduce our carbon footprints, more needs to be done. The first section describes the industry and its impact of greenhouse gas emissions. The second section will focus on the connection between the current regulations, laws, and incentives (or lack thereof) recognizing electric cars and their full and positive climate capabilities and the existing infrastructure. The third section shows how that understanding the benefits and challenges of electric vehicles can help shape future regulations of this massive and rapidly growing industry, and "drive" the world into a more climate-friendly future.

II. Electric Cars Reduce Greenhouse Gas Emissions

Greenhouse gases are gases that trap heat in the atmosphere and cause rising global temperatures leading to climate change.² In 2022, greenhouse gas emissions in the United States totaled 6.343 billion metric tons.³ Although this is a 3% overall decrease in greenhouse gas emissions from 1990, transportation accounts for the largest share of 2022 emissions, totaling 28.4%. Carbon dioxide emissions, a type of greenhouse gas and one of many gases that are released from a vehicle in motion (along with methane and nitrous oxide), are one of the primary drivers of climate change, and based on business-as-usual statistics, global carbon dioxide emissions are

¹ Hannah Ritchie, Pablo Rosado, Max Roser, *CO2 and Greenhouse Gas Emissions*, Our World in Data (2023), <https://ourworldindata.org/co2-and-greenhouse-gas-emissions#:~:text=Current%20policies%20have%20us%20on,had%20high%20emissions%20for%20centuries>.

² United Nations, *Causes and Effects of Climate Change*, United Nations Climate Change, <https://www.un.org/en/climatechange/science/causes-effects-climate-change#:~:text=As%20greenhouse%20gas%20emissions%20blanket,the%20usual%20balance%20of%20nature>

³ U.S. Environmental Protection Agency, *Climate Change Indicators: U.S. Greenhouse Gas Emissions*, Climate Change Indicators (Mar. 25, 2025), <https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions#:~:text=In%202022%2C%20U.S.%20greenhouse%20gas,above%201990%20levels%20in%20200>



expected to increase to some 43.08 billion metric tons in 2050.⁴ But what does all this data mean regarding climate change and electric vehicles?

To answer that, the basics of greenhouse gases must first be dissected. Greenhouse gases are a category of gases that absorb heat energy emitted from the planet's surface, and they linger in Earth's atmosphere for varying amounts of time, from a few years to thousands of years. Gas-powered vehicles produce emissions through their tailpipes, consisting mostly of greenhouse gases such as carbon dioxide, methane, and nitrous oxide.⁵ These emissions contribute to smog, haze, and health problems on top of climate change.⁶ Put into perspective, one drive in a gasoline-powered car produces greenhouse gases that will remain swirling around in the atmosphere for your entire life, your child's entire life, your grandchild's entire life, and your great-grandchild's entire life, if not longer. Not only is the health of humans being affected, but the climate is seeing real-time greenhouse gas effects. Some of these effects include rising sea levels, which significantly worsen the impacts of hurricanes, more severe heatwaves and droughts, and ocean acidification, which is rapidly killing many aquatic plants and animals.

This enormous impact might be slightly easier to visualize if the concept is further broken down. It is estimated that 90% of emissions during the lifecycle of a standard gas-powered car are due to usage. The U.S. Department of Energy estimates that a gasoline-powered vehicle emits roughly 12,594 pounds of carbon dioxide annually. If an average gas-powered car can drive 200,000 miles in its lifetime, and “lives” for roughly 13 years, then that is 163,722 pounds of carbon dioxide produced by one vehicle over its entire life.⁷ Now consider that the average lifespan

⁴ Statista, *Forecast of Carbon Dioxide Emissions Worldwide from 2018 to 2050*, Energy and Environment (Feb. 6, 2023), <https://www.statista.com/statistics/263980/forecast-of-global-carbon-dioxide-emissions/#:~:text=Based%20on%20a%20business%2Das,of%20carbon%20dioxide%20in%202018>.

⁵ U.S. Environmental Protection Agency, *What Are the Trends in Greenhouse Gas Emissions and Concentrations and Their Impacts on Human Health and the Environment?*, Report on the Environment (Jul. 8, 2024), <https://www.epa.gov/report-environment/greenhouse-gases>

⁶ U.S. Environmental Protection Agency, *Emissions from Electric Vehicles*, Fuels and Vehicles, <https://afdc.energy.gov/vehicles/electric-emissions>

⁷ Hearst Autos Research, *How Many Miles Does a Car Last?*, Car and Driver, <https://www.caranddriver.com/research/a32758625/how-many-miles-does-a-car-last/>



for a person in the United States is 78.4 years old, meaning that if they get a new car every 13 years from the time they turn 16 years old and usually get their license to the time they die, they'll have somewhere around 4 cars in their lifetime. One person, owning four cars over 62.4 years emits 654,888 pounds of carbon dioxide total.⁸ While this is a lot of carbon dioxide, the number standing alone might not seem like much, so to gain some perspective, a mature oak tree can only absorb 48 pounds of carbon dioxide annually.⁹ Thus, it would take one mature oak tree 13,643 years to absorb all 654,888 pounds of the carbon dioxide emitted by one person's vehicle over their lifetime. That is 13,643 years it will take to leave no trace of one person's travels in their cars, not considering any other emissions caused by one person (for example, air travel). Now, consider that an oak tree typically matures at 40 years old and lives about 900 to 1,000 years at the most. We either need 14 mature oak trees for each of the 233 million licensed United States drivers to keep pace annually, which is 3,262,000,000 oak trees dedicated solely to photosynthesis of carbon dioxide emitted from cars, not even taking into consideration any other carbon dioxide emitted by one person, or we need a different solution.¹⁰ And seeing as that is the required amount of trees for only 28.4% of all of the greenhouse gas emitted from the United States every year, planting over three billion oak trees in the United States for this purpose alone may not be feasible on its own, let alone waiting for each to mature and collect carbon dioxide fast enough to save the rapidly deteriorating climate, an alternative solution may just be electric vehicles.

The U.S. Department of Energy claims that all forms of electric vehicles can help improve fuel economy, lower fuel costs, and reduce emissions like greenhouse gases.¹¹ Not only that but

⁸ Shameek Rakshit and Matthew McGough, *How Does U.S. Life Expectancy Compare to Other Countries?*, Health System Tracker (Jan. 31, 2025), <https://www.healthsystemtracker.org/chart-collection/u-s-life-expectancy-compare-countries/#Life%20expectancy%20at%20birth,%20in%20years,%201980-2023>

⁹ Sarah Salhi, *The Life of an Oak Tree*, The Green Core (Jul. 14, 2023), <https://www.thegreencore.org/the-life-of-an-oak-tree/>

¹⁰ Mathilde Carlier, *Number of Licensed Drivers in the United States in 2022*, Statista (Nov. 27, 2024), <https://www.statista.com/statistics/191653/number-of-licensed-drivers-in-the-us-since-1988/#:~:text=Around%20235%20million%20people%20held,to%20become%20widely%20adopted%20soon.>

¹¹ U.S. Department of Energy, *Electric Vehicle Benefits and Considerations*, Fuels and Vehicles, <https://afdc.energy.gov/fuels/electricity-benefits>



using electricity as a power source for transportation improves public health and the environment, provides safety benefits, and contributes to a resilient transportation system.¹² In a report by the EPA, it was stated that in 2014, about 57 million Americans lived in counties that did not meet national air quality standards. In fact, the U.S. Department of Transportation stated on January 31st, 2025, that the American Lung Association predicts a transition to nationwide electric vehicle transportation by 2050 would save approximately 6,300 lives every year and avoid 93,000 asthma attacks, a major boost to the push for better overall public health.¹³ Not only that, but for cities like Los Angeles that suffer from very poor air quality, one study predicts that by 2050, electric vehicles would save Los Angeles residents an estimated \$12.6 billion in annual health-care costs, which is especially impactful for the many thousands of low-income L.A. residents who are powerless to escape the smog and unable to meet the rising cost of healthcare.¹⁴

All-electric vehicles have zero tailpipe emissions, meaning that the tailpipe of an electric vehicle does not pump greenhouse gases into the air in the amount that a gasoline-powered car does.¹⁵ If a modern electric vehicle utilizes energy generated from hydroelectricity, wind, or solar power, all of which can be feasible, then it is a zero-emission tailpipe and charging vehicle. Electric vehicles also require fewer battery replacements than gas required to be replenished in gas-powered vehicles. According to the National Renewable Energy Laboratory, their predictive modeling indicates that today's batteries may last between ten and fifteen years in moderate climates, and between eight and twelve in extreme climates, which is about the same lifetime, if not a little bit longer than the lifetime of a gas-powered car.¹⁶

¹² *Id.*

¹³ U.S. Department of Transportation, *Benefits to Communities*, Electric Vehicles, <https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community-benefits>

¹⁴ Courtney Lindwall, *Why the Electric Vehicle Revolution Can Benefit Everyone*, NRDC (Apr. 18, 2023), <https://www.nrdc.org/stories/why-electric-vehicle-revolution-can-benefit-everyone>

¹⁵ U.S. Department of Transportation, *Benefits to Communities*, Electric Vehicles, <https://www.transportation.gov/rural/ev/toolkit/ev-benefits-and-challenges/community-benefits>

¹⁶ U.S. Department of Energy, *Electric Vehicle Benefits and Considerations*, Fuels and Vehicles, <https://afdc.energy.gov/fuels/electricity-benefits>



Not only are there possibilities of positive effects to the climate because of increased use in electric vehicles, but there have also been economic benefits. The electric vehicle sector of the American workforce has added six thousand jobs since 2020, an eight percent growth.¹⁷ It would also reduce (but likely not eliminate) the United States' reliance on fossil fuels from international sources, like Canada, Mexico, Saudi Arabia, Iraq, and Brazil; the top five of eighty-six countries that the United States received petroleum from in 2023.¹⁸

Most people in 2025 know that Tesla is now one of the most popular electric vehicle manufacturers, and for good reason, but what many people may not know is that the idea of electric vehicles came much before Tesla, with musings tracing back to the 1830s.¹⁹ Tesla's first electric vehicle, the Roadster, premiered in 2009, and prior to Tesla's Model S in 2012, there was no such thing as a "luxury electric vehicle."²⁰ Tesla's total revenue for 2024 was \$97.7 billion, and Tesla's global electric vehicle sales number for 2023 was 1,845,985.²¹ But besides their Tesla Model S, why is Tesla so popular? There are many speculations but most of the credit goes to their innovative and unique vehicles, their ability to scale operations and expand into new markets, and their low production costs.²² Tesla's vehicles are sleek and modern, with semi-autonomous driving capabilities, over-the-air software updates and other advanced technology equipped in each vehicle, allowing Tesla to stay ahead of competitors in their vehicle designs. Tesla's ability to scale operations and expand into new markets has been made possible by their focus on automation and technology. Credit for Tesla's ability to have low production costs goes to advanced

¹⁷ Courtney Lindwall, *Why the Electric Vehicle Revolution Can Benefit Everyone*, NRDC (Apr. 18, 2023), <https://www.nrdc.org/stories/why-electric-vehicle-revolution-can-benefit-everyone>

¹⁸ U.S. Energy Information Administration, *Oil Imports and Exports*, Oil and Petroleum Products Explained (Jan. 19, 2024), <https://www.eia.gov/energyexplained/oil-and-petroleum-products/imports-and-exports.php>

¹⁹ Kevin A. Wilson, *Worth the Watt: A Brief History of the Electric Car 1830 to Present*, Car and Driver (Mar. 31, 2023), <https://www.caranddriver.com/features/g43480930/history-of-electric-cars/>

²⁰ *Id.*

²¹ BuyaCar, *The Latest Tesla Statistics*, (Apr. 17, 2025), <https://www.buyacar.co.uk/the-latest-tesla-statistics/>

²² Andreas Lehmann, *7 Reasons Why Tesla Became So Successful*, Medium (Jan. 14, 2023), <https://dailyknowhow.medium.com/7-reasons-why-tesla-became-so-successful-e5cf66d41228>



manufacturing technology and techniques. For example, the company's electric powertrain is more efficient and less expensive to produce than traditional internal combustion engines, and Tesla has developed its own battery technology, which is less expensive than traditional battery technology.

It is also worth noting that used EV batteries can sometimes be recycled, however, they can be challenging to recycle correctly, given the chemical makeup that includes cobalt and nickel, among other chemicals.²³ Along with that, most companies do not yet have the infrastructure to take in recycled electric vehicle batteries in large quantities.²⁴ This could be an area for the government to invest in, though, as the overall value of using an electric car for the climate is already more than if a gas-powered car is driven, so if the batteries in these vehicles can also be recycled, this would create an even greener electric vehicle process. Electric vehicle battery recycling is also lucrative for the private sector, as the value generated per ton of battery material is around \$600.²⁵ Other studies show that electric vehicle batteries could have at least 70% of their initial capacity left at the end of their life, assuming they've not failed or been damaged.²⁶ These batteries could also be reused for backup power applications like powering portable devices or replacing diesel backup generators.²⁷ Although there may not be many recycling options for EV batteries at this point, certain consumers would be able to reuse them, allowing for a greener end-of-life process for EV batteries.

Given all of the data, it would seem that electric vehicles are a feasible solution to the nationwide transportation emission issue. However, there are still challenges associated with electric vehicles, both environmentally, politically, and economically, as they see a rise in popularity in the United States and across the world.

²³ U.S. Department of Energy, *Batteries for Electric Vehicles*, Fuels and Vehicles, <https://afdc.energy.gov/vehicles/electric-batteries>

²⁴ *Id.*

²⁵ McKinsey & Company, *Battery Recycling Takes the Driver's Seat, Automotive and Assembly* (Mar. 13, 2023), <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/battery-recycling-takes-the-drivers-seat>

²⁶ U.S. Department of Energy, *Batteries for Electric Vehicles*, Fuels and Vehicles, <https://afdc.energy.gov/vehicles/electric-batteries>

²⁷ *Id.*



III. Environmental, Infrastructure, and Economic Challenges of Widespread EV Adoption

As electric vehicle demand rises, so too do the emissions produced from manufacturing these cars, such as the demand for batteries, motors, charging stations and other resources that negatively impact the climate. The components of an electric vehicle's batteries include minerals that can be extracted and obtained only by mining, and the rapid extraction of elements like Lithium, Nickel, Cobalt, Graphite, Zinc, Silicon, and other Rare-Earth minerals is causing environmental and human rights issues as they increase in demand.

Fossil fuel mining, which includes coal, oil, and gas, is estimated to produce about 34 billion tons of carbon dioxide worldwide annually.²⁸ The compounds and minerals required for electric vehicles include Lithium, the mining of which accounts for 15 million tons of carbon dioxide emissions annually, Cobalt, the mining of which pales in comparison at 1.5 million tons, and Nickel, the mining of which produces roughly 120 million tons of carbon dioxide annually as of 2019.²⁹ Although mining these elements may still be producing large carbon dioxide emissions, they are significantly less than those carbon dioxide emissions produced by fossil fuel mining and should be considered a small win for adaptation and mitigation of climate change. It could be argued, however, that regardless of whether the electric vehicle market is growing or shrinking, fossil fuel mining will not halt, as there is still a need for fossil fuels in other industries like manufacturing, mining, construction, and agriculture, that does not seem to be diminishing any time soon. However, as the Supreme Court said in *Massachusetts v. EPA*, "slow progress (in

²⁸ March Zheng, *The Environmental Impacts of Lithium and Cobalt Mining*, Earth.org (Mar. 31, 2023), <https://earth.org/lithium-and-cobalt-mining/>

²⁹ *Id.*



climate change) whittles away at the problem over time," and maybe the declining need for fossil fuels from car manufacturing will stir up a domino effect in other fossil fuel-reliant industries.³⁰

Human rights issues have accompanied the mining of elements necessary for electric vehicle production as well. Lithium is mined primarily in Australia and Chile, however places like Zimbabwe are seeing an increase in employment at their lithium mines with the increase in demand for the mineral, and along with that, an increase in corruption, unsafe working conditions, and child labor.³¹ Mining in the Democratic Republic of Congo (DRC) makes up about 80% of the country's earnings, and Cobalt mining is thriving there as demand for technology requiring batteries, including electric vehicles, increases rapidly. However, the DRC is also experiencing what some call "modern-day slavery" in the acquisition of Cobalt, in that the exploitation and degradation of these jobs are on par with past slavery.³² Each day, men, women and many children in the DRC spend hours maneuvering pickaxes and shovels through Cobalt mines, grabbing the toxic mineral with their bare hands and hauling it out of the mines, the contaminated Cobalt-filled air rushing through their lungs, with the Cobalt-polluted water as their only option for a refreshment, all for a couple of dollars per day.³³ While tech companies are attempting to figure out a way that Cobalt can be more ethically mined, the arduous mining process in these third-world countries marches on, injuries being sustained and deaths accumulating with each passing day.

Nickel, the twenty-fourth most abundant element in the Earth's crust, was once a scarcely used metal; now, Nickel plays one of the most important roles in modern energy, most notably in helping to power electric vehicles.³⁴ Specifically, 60% of nickel demand in 2040 is expected to be

³⁰ *Massachusetts v. EPA*, 549 U.S. 497, 504 (2007).

³¹ Katie Surma, *Corruption and Rights Abuses Are Flourishing in Lithium Mining Across Africa*, Inside Climate News (Nov. 15, 2023), <https://insideclimatenews.org/news/15112023/lithium-mining-africa-human-rights-violations-corruption/>

³² Terry Gross, *How Modern-Day Slavery in the Congo Powers the Rechargeable Battery Economy*, NPR (Feb. 1, 2023), <https://www.npr.org/sections/goatsandsoda/2023/02/01/1152893248/red-cobalt-congo-drc-mining-siddharth-kara>

³³ *Id.*

³⁴ ISS Insights, *Nickel Supply Risks and ESG Issues*, Climate Change and Sustainability (Apr. 12, 2023), <https://insights.issgovernance.com/posts/nickel-supply-risks-and-esg-issues/>



created from batteries alone, a demand that has increased by 3x since 2016.³⁵ Unfortunately, while this high demand may be producing jobs in nickel mining or economic benefits for others, nickel mining has detrimental effects on the environment. As the world's largest nickel producer, Indonesia's environment has been suffering the most from this uptick in nickel demand. Requiring the land, nickel mining has laid waste to entire forests in Indonesia, which has contributed significantly to air pollution, and has contaminated the water found near the mines, affecting both aquatic life and public health.³⁶

The effect that coal has on electricity should also be considered in this equation. Coal is the second-most used electricity source for electric vehicles, and although it has been on the decline since roughly 2005, the United States is still using 469.94 million short tons of coal for electricity, accounting for 19.85% of total United States electricity generation.³⁷ As implied by the name, electric cars require electricity to run, and the average electric vehicle can go about 205 miles on a full charge.³⁸ Once the vehicle needs to be charged, it can take anywhere from 20 minutes to 50 hours to fully charge, depending on the size of the battery and the charging station.³⁹ Thus, when a person plugs their car in to charge it, the car requires 1.14 pounds of coal per kilowatt-hour (kWh) of the battery. The consideration that plenty of coal is being used to power these vehicles, due to the need to charge them, is significantly contributing to air pollution and other climate issues cannot go unnoticed. According to a national average, natural gas is most used as a source of electricity at 38.32%, nuclear energy is third-most used after coal at 18.60%, wind is the fourth-

³⁵ *Id.*

³⁶ *Id.*

³⁷ U.S. Energy Information Administration, *Coal Explained*, Use of Coal, <https://www.eia.gov/energyexplained/coal/use-of-coal.php>

³⁸ U.S. Department of Energy, *At a Glance: Electric Vehicles*, Alternative Fuels Data Center, https://afdc.energy.gov/files/u/publication/electric-drive_vehicles.pdf

³⁹ U.S. Department of Transportation, *Charger Types and Speeds*, Electric Vehicles (Jan. 25, 2025) <https://www.transportation.gov/rural/ev/toolkit/ev-basics/charging-speeds#:~:text=Level%201%20chargers%20can%20take%2040%2D50+,%20hours,empty%20and%205%2D6%20hours%20for%20a%20PHEV.&text=Level%202%20chargers%20can%20charge%20a%20BEV,hours%20and%20a%20PHEV%20in%201%2D2%20hours>.



most used at 10.47%, and the fifth largest source of electricity is hydro at 6.14%.⁴⁰ Also, in defense of electric vehicles' climate change reputation, gas-powered vehicles use electricity through their batteries too. And, electric vehicles waste less energy than gas-powered vehicles, only losing about 11% of their energy, with the other 89% going toward other efficiencies, like pushing the wheels forward.⁴¹ A gas-powered vehicle wastes about 80% of its energy, with only around 20% of its energy going toward pushing the wheels forward.⁴²

Another issue that the electric vehicle industry is seeing is the United States' lack of infrastructure to support the vehicles, with some of the biggest problems including lack of charging stations and lack of repair locations available. In fact, a class action was filed against Tesla to address the rights of Tesla owners to use third-party repair shops. The class action accused Tesla of tying repairs and parts exclusively to Tesla purchases, thereby prohibiting the owners to seek repairs elsewhere, and causing them to suffer lengthy delays in repairs and maintenance, and pay supercompetitive prices for those parts or repairs.⁴³

Strictly using statistics, the data seems to show that when compared to fossil fuel-powered vehicles, electric vehicles are polluting significantly less. Although electric vehicles have the potential to reduce our carbon footprint by lessening the amount of greenhouse gases that are produced from a ride in the car alone, the greenhouse gases released, electricity used, and human rights violated during the acquisition of essential elements, manufacturing and charging of an electric vehicle over its lifetime may make up for that deficit, depending on the outlook of the person viewing the data.

⁴⁰ U.S. Energy Information Administration, *Electricity Explained*, Electricity in the United States (Mar. 26, 2024), <https://www.eia.gov/energyexplained/electricity/electricity-in-the-us.php#:~:text=Fossil%20fuels%20accounted%20for%20about,and%20other%20miscellaneous%20energy%20sources>.

⁴¹ Karin Kirk, Electric Vehicles Use Half the Energy of Gas Powered Vehicles, Yale Climate Connections (Jan. 29, 2024), <https://yaleclimateconnections.org/2024/01/electric-vehicles-use-half-the-energy-of-gas-powered-vehicles/>

⁴² *Id.*

⁴³ Lindsay Clark, *Tesla's Tight Grip on Repairs Sparks Courtroom Showdown*, The Register (Jun. 20, 2024), https://www.theregister.com/2024/06/20/tesla_right_to_repair/



IV. Future Regulations That Will Likely Shape the Growth and Sustainability of the EV Industry

With the rise of EV popularity, the federal and state laws, regulatory actions, and policy proposals are currently playing catch up, and while some introduced have passed and others have failed, the mere fact that these types of ideas are brought up is likely to bring awareness of the need for these laws and regulations and hopefully influence future national laws. This trend is rarely seen at the federal government level, however, there have been some recent federal government decisions that have created a positive outlook on climate change, with the United States Postal Service committing to purchasing a new fleet of vehicles in 2022, 75% of which are electric. 10 n.⁴⁴ The U.S. Postal Service also intends to set up electric vehicle charging stations to support this \$40 billion investment strategy to upgrade and improve the USPS processing, transportation, and delivery networks.⁴⁵ The goal of the U.S. Postal Service is to acquire and deploy 66,000 electric vehicles by 2028 and given that the U.S.P.S. has 246,503 vehicles on the road right now, this would be about 26.7% of its total fleet; a good start to shifting the U.S.P.S. fleet to EVs completely, which is likely to happen in the future.⁴⁶

Massachusetts v. Environmental Protection Agency (EPA),⁴⁷ one of the most significant climate cases to ever reach the United States Supreme Court, may be credited with an increased awareness of climate change across the nation. More importantly, regarding electric vehicles, the precedent that *Massachusetts v. EPA*⁴⁸ set may influence the future of laws and regulations in the motor and electric vehicle industry. The case itself was decided in 2007 by the Supreme Court,

⁴⁴ U.S. Department of Transportation, *Investing in America: Number of Publicly Available Electric Vehicle Chargers Has Doubled Since Start of Biden-Harris Administration*, Newsroom (Aug. 27, 2024), <https://highways.dot.gov/newsroom/investing-america-number-publicly-available-electric-vehicle-chargers-has-doubled-start>

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Massachusetts v. EPA*, 549 U.S. 497 (2007)

⁴⁸ *Id.* at 534



and it was brought by a group of States, local governments, and private organizations, claiming that the Environmental Protection Agency abdicated its responsibility under Section 202(a)(1) of the Clean Air Act to regulate the emissions of four greenhouse gases, including carbon dioxide.⁴⁹ Specifically, Section 202(a)(1) states that "The EPA Administrator shall by regulation prescribe (and from time to time revise) in accordance with the provisions of this section, standards applicable to the emissions of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in the EPA Administrator's judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare."⁵⁰ The EPA believed that greenhouse gases are not air pollutants within the meaning of the Act, the Act defining "air pollutant" as "any physical, chemical, substance or matter which is emitted into or otherwise enters the ambient air, but only if it retains the general characteristic of being an air pollution agent or combination of such agents," the Court finding that this definition is inclusive of various greenhouse gases emitted from vehicles, including carbon dioxide.⁵¹

The Court in *Massachusetts v. EPA*⁵² was asked to consider whether the EPA has a statutory authority to regulate greenhouse gas emissions from new motor vehicles, and if so, whether the EPA's reasoning for refusing to do so is consistent with the statute.⁵³ The Court determined that the EPA's steadfast refusal to regulate greenhouse gas emissions presented a risk of harm to Massachusetts that is both actual and imminent, even though effects were seen in other locations as well as Massachusetts, and that there was a substantial likelihood that the judicial relief requested would prompt the EPA to take steps to reduce that risk.⁵⁴ While the EPA does not

⁴⁹ *Id.* at 505

⁵⁰ *Id.*

⁵¹ *Id.*

⁵² *Id.* at 505. See also Richard J. Lazarus, *The Making of Environmental Law* (2d ed. 2006)

⁵³ *Id.* at 1446

⁵⁴ *Id.*



see the purpose in solving this issue now, the Court further reasons that a reform (of climate change) may happen one step at a time, but slow progress whittles away at the problem over time.⁵⁵ One of the reasons that the EPA gives for not regulating carbon dioxide emissions from motor vehicles would require it to tighten mileage standards, a job assigned to the Department of Transportation, to which the Court responds that "while the two obligations may overlap, there is no reason to think the two agencies cannot both administer their obligations and yet avoid consistency."⁵⁶ The Court also notes that the EPA has refused to comply with its' duties under the Clean Air Act, which require that the EPA conform its reasoning for failing to regulate new motor vehicles under the authorizing statute.⁵⁷ The Supreme Court concludes that "the EPA has offered no reasoned explanation for its refusal to decide whether greenhouse gases cause or contribute to climate change. Its action was therefore arbitrary, capricious, or otherwise not in accordance with law. The EPA must ground its reasons for action or inaction in the statute."⁵⁸ Put simply, the EPA cannot decline to issue emission standards for motor vehicles based on policy considerations not enumerated in the Clean Air Act, and the Clean Air Act gives the EPA authority to regulate greenhouse gases like carbon dioxide, one of the most frequently emitted greenhouse gases from gasoline-powered vehicles. This was a monumental victory for those on the side of fighting against climate change. Even more, it specifically addresses that the EPA does have the power to regulate motor vehicle emissions, and in 2025, the importance of this precedent for electric vehicles cannot go unnoticed. The Supreme Court confirmed in 2007 that the EPA today could do something along the lines of limiting the emissions output of any given vehicle, ultimately pushing the United States citizens more toward electric vehicle purchases that have a lower emissions output. Although this

⁵⁵ *Id.* at 1457.

⁵⁶ *Id.* at 1462.

⁵⁷ *Id.* at 1459.

⁵⁸ *Id.* at 1463.



has yet to be seen, current policies and administrations may not have this issue at the top of their list, and it may walk the line between creating public regulation and bolstering private business, but it is something that will ultimately be beneficial for the climate if considered by the EPA in the future. Not only that, but this could also align the federal government with the vision of local and state governments, who are stepping up with ideas to combat climate change on their own.

Indeed, Illinois was early to recognize the benefits of electric vehicles, enacting the "Electric Vehicle Act" on July 11th, 2011.⁵⁹ The Electric Vehicle Act stated "the General Assembly finds that the adoption and use of electric vehicles would benefit the State of Illinois by (i) improving the health and environmental quality of the residents of Illinois through reduced pollution, (ii) reducing the operating costs of vehicle transportation, and (iii) shifting the demand for imported petroleum to locally produced electricity."⁶⁰ From this, the State of Illinois created a position for an Electric Vehicle Coordinator to act as a point person for electric vehicle-related policies and activities in the state, and an Electric Vehicle Advisory Council to investigate and recommend strategies to implement to promote the use of electric vehicles.⁶¹ These kinds of Acts implemented by states are empowering to other states across the nation, and as early as Illinois was in affirming this act in 2011, it's glaringly obvious that they correctly predicted the massive change that electric vehicles started to bring in the late 2010s and early 2020s and managed to look out for their citizens' interests early.

These days, States across the nation seem to recognize the growth of electric vehicles and have responded in ways that will encourage their citizens to think of climate change in their day-to-day lives. States like Florida are instituting laws and incentives, including developing

⁵⁹ Electric Vehicle Act of 2011 §2902

⁶⁰ *Id.*

⁶¹ *Id.*



infrastructure plans for electric vehicle charging systems along the State Highway System, the availability of which they hope will reduce emissions and thereby lower the impact of climate change on their state. 14 n.⁶². Other states like Pennsylvania have taken the opposite approach, seemingly dissuading electric vehicle ownership. Specifically, Pennsylvania has been charging electric vehicle owners an annual registration fee of \$200, whereas a gas-powered vehicle owner is only required to pay \$38 annually for their registration fee. 14 n.⁶³. However, Pennsylvania is allowing electric vehicle owners to be exempt from the Alternative Fuels Tax, which taxes alternative fuels used on any public highway.⁶⁴ Leading the climate change fight is California, in particular, with the creation of a law that beginning January 1st, 2035, school districts may only purchase or lease zero-emission school buses.⁶⁵ California has also created an incentive that, as of September 16th, 2022, vehicles purchased using a grant from the "Clean Cars 4 All" program are exempt from sales tax.⁶⁶ And perhaps one of the most hopeful messages regarding the need for more incentives comes from those who are preparing to take on the climate fight in the legal world. A law review article published by Shahil Patel, J.D. Candidate at Emory University, emphasizes that if there is ever going to be widespread adoption of electric vehicles in the United States, the industry needs to develop a much better charging infrastructure.⁶⁷ Indeed, there are about 161,562 charging ports in the United States as of the beginning of 2024, while there are roughly 145,000 fueling stations across the nation.⁶⁸ Based on these numbers, it may seem that the number of

⁶² Fla. Stat. §339.287 (Lexis)

⁶³ U.S. Department of Energy, *Alternative Fuel Tax Exemption for EVs*, Alternative Fuels Data Center (Jul. 11, 2024), <https://afdc.energy.gov/laws/13522>

⁶⁴ *Id.*

⁶⁵ U.S. Department of Energy, *Zero Emission School Bus Acquisition Requirements*, Alternative Fuels Data Center (Oct. 18, 2023), <https://afdc.energy.gov/laws/13373>

⁶⁶ U.S. Department of Energy, *Fuel-Efficient Vehicle Tax Exemption*, Alternative Fuels Data Center (Sept. 16, 2022), <https://afdc.energy.gov/laws/13150>

⁶⁷ Shahil Patel, Article, *Electric Vehicle Limbo: The Need for Charging Incentives*, 8 Emory Rev. 75

⁶⁸ U.S. Department of Transportation, *Investing in America: Number of Publicly Available Electric Vehicle Chargers Has Doubled Since Start of Biden-Harris Administration*, Newsroom (Aug. 27, 2024), <https://highways.dot.gov/newsroom/investing-america-number-publicly-available-electric-vehicle-chargers-has-doubled-start#:~:text=Since%20the%20start%20of%20the,investments%20for%20EV%20charging%20infrastructure.>



charging ports is outpacing fueling stations in the United States, but something worth considering and to Patel's point, the quoted number of fueling stations consists of multiple pumps per station, whereas one charging port charges one electric vehicle. It seems the Biden-Harris Administration took note of the lack of infrastructure for electric vehicles in late 2024, when they announced \$521 million in grants to build out electric vehicle charging infrastructure, in hopes of increasing access and reliability to communities across the country.⁶⁹ While the incentives being provided at the state and local level are inspiring for climate change mitigation, the future generation pointedly displays that there are still many developments that need to occur in the electric vehicle industry before widespread change occurs.

Although there are some positive incentives to use electric vehicles in certain states, do not be fooled into believing that this battle for widespread electric vehicle use (as opposed to gas-powered vehicles) will be a simple one. As with any industry, once there is a major shift in the success of a certain product, every other company is going to attempt to create that success for themselves. In January 2025, the City of New York sued defendants ExxonMobil, BP, and Shell for engaging in deceptive trade practices that misled New York City consumers regarding the environmental impact of the defendants' fossil fuel products and their commitment to renewable energy.⁷⁰ The Supreme Court of New York held that the complaint failed to state a claim for two reasons: (1) the City's allegation that New York City consumers are climate-conscious, yet they are being misled by defendant's failure to disclose that fossil fuels cause climate change is not sufficient because it assumes that the connection between fossil fuels and climate change is publicly known information; and (2) the City did not sufficiently plead that defendants' alleged greenwashing campaigns were "made in connection with the sale" of a consumer good in New

⁶⁹ *Id.*

⁷⁰ *City of New York v. Exxon Mobil Corp.*, 226 N.Y.S. 3d 863, 867 (2025).



York City. *Id.* In 2025, it seems hard to fathom that a citizen may not know that fossil fuels and their use are directly linked to climate change, but this holding only emphasizes the need for awareness of climate change, and the arguably greater need for education of citizens to navigate through thinly-veiled greenwashing tactics as a ploy to gain customers and increase their revenue without doing any of the work required to be a climate-friendly company.

Federal incentives regarding electric vehicles seem to outweigh federal laws, according to the U.S. Department of Energy's Alternative Fuels Data Center. Some of the federal government's incentives include tax credits for businesses and organizations for purchasing new EVs, crediting as much as \$7,500 for vehicles under 14,000 pounds, and \$40,000 for vehicles above \$14,000. 16 n.⁷¹. Until the majority of vehicles on the road are electric, this tax credit could be a very useful incentive to encourage electric vehicle purchases. Bills like the "Climate Leadership and Environmental Action for our Nation's Future" Act are being introduced in an attempt to put the United States on a path to a net-zero greenhouse gas economy. This Act, in particular, had multiple mentions of climate-positive electric vehicle actions and was introduced in the House of Representatives in March of 2021.⁷² The Act failed, yet another showing that there are only a couple of instances of national change when it pertains to the environment.

It's also noteworthy that the United States has once again withdrawn from the Paris Agreement, a decision that will likely have detrimental impacts on the electric vehicle industry. The United States initially entered the Paris Agreement in 2016, and then later withdrew in 2017, and entered once again in 2021. 20 n.⁷³. For context, the Paris Agreement is an international treaty on climate change with a goal to "hold the increase in the global average temperature to well below

⁷¹ U.S. Department of Energy, Commercial Electric Vehicle and Fuel Cell Electric Vehicle Tax Credit, Alternative Fuels Data Center (Aug. 16, 2022), <https://afdc.energy.gov/laws/13039>

⁷² Climate Leadership and Environmental Action for our Nation's Future H.R. 1512 (2021)

⁷³ NRDC, *Paris Climate Agreement: Everything You Need To Know*, Data Reports and Resources (Jan. 23, 2025) <https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know#sec-what-is>



2 degrees Celsius (3.6 degrees Fahrenheit) and pursue efforts to limit the temperature increase to 1.5 degrees Celsius (2.7 degrees Fahrenheit) above pre-industrial levels.”⁷⁴ With transportation emissions totaling 28.4% of all greenhouse gas emissions in the country, the United States may see some rollback on important federal incentives and initiatives in favor of slowing climate change and increasing the use of electric vehicles.⁷⁵ This withdrawal can be seen in the executive order signed on January 25th, 2025, with Section 1 seeming to understand the importance of the work the United States has done for climate change, stating “over the decades, the United States has simultaneously grown its economy, raised worker wages, increased energy production, reduced air and water pollution, and reduced greenhouse gas emissions,” seemingly implying that it is possible to balance economic success while remaining environmentally conscious.⁷⁶ However, Section 3 proceeds to withdraw the United States from the Paris Agreement, revokes the U.S. International Climate Finance Plan, and ceases/revokes any financial commitment made under the United Nations Framework Convention on Climate Change.⁷⁷ These withdrawals and revocations will likely impact electric vehicles by a domino effect. If the vast majority of the country witnesses these revocations and withdrawals, it is possible the citizens could begin to question the reality of climate change (or at least question whether fighting climate change really requires the United States’ involvement), and thus the United States citizens may feel less inclined to take active steps toward adaptation, mitigation, and prevention of climate change in their everyday lives, like buying an electric vehicle. This could also have an impact on other countries and those citizens who see the United States as one of the world leaders. Regardless of political stance, working

⁷⁴ United Nations Climate Change, *The Paris Agreement*, Process and Meetings, <https://unfccc.int/process-and-meetings/the-paris-agreement>

⁷⁵ United States Environmental Protection Agency, *Fast Facts on Transportation Greenhouse Gas Emissions*, Vehicles, Greenhouse Gases & Smog, <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions#:~:text=The%20transportation%20sector%20is%20one,transportation%20end%2Duse%20sector%20emissions>.

⁷⁶ The White House, *Putting America First in International Environmental Agreements*, Presidential Actions (Jan. 20, 2025) <https://www.whitehouse.gov/presidential-actions/2025/01/putting-america-first-in-international-environmental-agreements/>

⁷⁷ *Id.*



against climate change requires unity among all people across all countries in the world, as it is something that has or will touch each person on Earth. Learning of the importance of electric vehicles in mitigating climate change may be one small step in the right direction in pursuit of this goal.

V. Conclusion

It's almost common knowledge for a U.S. citizen in 2025 to know that electric vehicles are better for the environment than gasoline and diesel-powered vehicles. However, they may not understand the intricacies that lie under the hood, such that electric vehicles reduce greenhouse gas emissions in a way that gasoline and diesel cars cannot. Even if citizens are armed with the knowledge that electric vehicles harm our environment less than a gasoline-powered vehicle, that does not necessarily mean they will act on that knowledge and purchase an electric vehicle for the better of our environment. Our biggest enemy in the climate fight is ignorance, a direct path to complacency. It is now more crucial than ever to make people aware that while these electric vehicles lessen greenhouse gas emissions from each drive in a way that was previously unknown, there are still other environmental, human rights, and economic hardships and challenges associated with these vehicles. People also need to hold their local government accountable to make changes in the electric vehicle space. Not only that, but the government itself, at both the local and federal levels, must create positive reinforcement to reward citizens engaged in the climate fight. And, if society turns a blind eye to creating a more climate-friendly car simply because the electric vehicles that are available now are better for the environment than any vehicle on the market before, climate improvement will only move forward so much before it begins to stall. Education, laws, and incentives, however, can help us put our foot on the gas and get one mile closer to realizing the electric vehicles' full potential for the health of our planet.

