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Electric Vehicle Policy

At the turn of the 20th century Americans were using a variety of methods to navigate bustling city streets. While horses still dominated, the arrival of cars shifted the landscape irrevocably. There were three competing methods on the market used to power vehicles; gasoline, steam, and electric. By the turn of the millennium, however, only gasoline remained. Due to market trends, vehicular mileage constraints, and cost, all other methods failed. Steam-power was slow to start, limited in range, noisy, and required copious amounts of water. Electric-power was limited in infrastructure, bad for long-distances, and much more expensive. Nobody in the automotive industry could argue that steam is the future, but the opposite is true for electric.

The modern electric car’s rise truly begins in the first of large-scale oil crises in the 1970s. After OPEC’s embargo, Americans first realized that their dependence on gasoline to power their automobiles gave foreign powers incredible influence over their daily lives. However, the technology required for electric vehicles to adequately compete on the market was nonexistent in the 70s. According to the U.S. Department of Energy, it was environmental concerns raised in the 1990s that caused renewed interest in alternatives to gasoline. The passage of the 1990 Clean Air Act Amendment and the 1992 Energy Policy Act spurred interest in fuel economy, while actions taken separately by the California Air Resources Board pushed automakers to further develop greener alternatives (“History of Electric Vehicles”).

Until the past few years, gas prices in the new millennium had dramatically increased relative to their previous values. According to Energy Trends Insider, the average price of a gallon of gasoline in 2011, $3.53, was 243 percent higher than 1998’s price of $1.03 (Avro). This provided an opening for new hybrid vehicles to enter the domestic market. The Toyota Prius gained widespread success during this time, with competitors like the Honda Insight also selling well (“History of Electric Vehicles”).

Even with advancements, however, vehicle emissions worldwide have contributed more and more to climate change. The transportation sector surpassed power generation in 2017 to become the largest emitter of carbon dioxide emissions in the United States (Lindstrom). In fact, the transportation “was the only consumption sector where CO2 emissions increased in 2016,” doing so by 1.9 percent, with motor gasoline increases responsible for 1.8 percent of that statistic (Lindstrom). The power generation sector has begun to invest more heavily over the past 15 years in wind and solar power as alternatives to coal, and increasingly, natural gas—but according to Brett Smith, assistant director of the Center for Automotive Research, “there isn’t the same push” for automobiles (Milman).

 The Environmental Protection Agency estimates that “45 million people in the United States live, work, or attend school within 300 feet of roadways with high concentrations of air pollution due to motor vehicle emissions” (Calvino). Health risk associated with exposure to vehicle emissions include asthma, cardiovascular disease, and negative developmental effects. Reducing the country’s reliance on the internal combustion engine will help Americans live healthier lives and fight climate change—but reaching that reality will be no easy feat.

 Many of the world’s major economies have enacted aggressive policies aimed directly at curbing the use of gasoline-powered vehicles. In France, for example, the ostensibly centrist government of Emanuel Macron announced in 2017 that by the year 2040 France will end the sale of “petrol and diesel cars by 2040” (Chrisafis), with hybrid vehicles expected to remain on the market. France is not alone. The United Kingdom similarly banned the sale of fossil fuel-powered vehicles by 2040, with the added stipulation that by 2050 no pollutant-emitting vehicles of any kind will be allowed to drive in the country. For Norway, all passenger vehicles sold in 2025 are expected to be zero-emission, and already 40% of cars sold in 2016 there were electric or hybrid models (Petroff). Similar measures have undertaken by cities, states, and other countries throughout the continent (Roberts).

 These laws and guidelines, however, are not limited to Europe. Both China and India have rapidly growing automobile markets as more and more of their citizens gain access to the middle class. Chinese consumers now account for around 30 percent of all new vehicle sales in the world, surpassing the United States. The two most populated nations in the world have issued national guidelines that will likely lead to the end of gasoline and diesel sales in the next few decades, which will incentivize automakers worldwide to adjust their vehicle portfolios accordingly (Roberts).

 The federal government has taken actions to jumpstart the electric vehicle industry in the United States, but its investment has paled in comparison to that of the Chinese government’s. An analysis of the burgeoning electric car industry by *The New York Times* warned that automakers “are shifting crucial scientific and design work to China as the country invests heavily in car-charging stations and research,” including American juggernauts saved by the federal government less than a decade ago—Ford and GM (Bradsher). Volkswagen has similarly taken to focusing on the Chinese market for research, development, and early-market adoption of electric cars relative to its home country of Germany or the United States.

 For international corporations to operate in China they must give up the expectation that intellectual property and trade secrets will not be handed to fully domestic Chinese competitors by the government. China’s massive investments in artificial intelligence, automation, renewable energy, and now, electric vehicles, threatens to dethrone the United States as the global leader in advanced technology and investment (Bradsher).

In the United States, action to support electric vehicles has largely been included as segments of much larger legislative packages. Amid the growing financial crisis of 2008, President Bush signed Public Law 110-334 into law. One of the three acts passed within that legislation was the Energy Improvement and Extension Act of 2008. The bill provided vehicle tax credits of $7,500 for new electric drive vehicles bought that weigh under 10 tons. For vehicles weighing between 10 and 14 tons, the credit was $10,000. Increments went up accordingly, with $12,500 for vehicles over 14 tons up to 26 tons, with the final bracket giving $15,000 over 26 tons (“110th Congress Public Law 334”). Once a single car manufacturer sells 200,000 plug-in vehicles in the United States, the tax credits consumers receive for buying their electric vehicles begins to phase-out. The tax credit was advocated for by long-term congressman Sander Levin, a Democrat currently representing Michigan’s 9th congressional district which in 2008 was referred to as Michigan’s 12th. His district at the time was located in the northern suburbs of Detroit, and his website states “he was instrumental to the enactment of the $7,500 tax credit for plug-in hybrid passenger vehicles” (“About Sandy.”). Since his district’s largest employers consist of automakers and its affiliated economy, his work in making electric vehicles more affordable had a lot of impact on the bipartisan legislation written by a Democratic Congress but signed into law by George W. Bush.

The American Recovery and Reinvestment Act of 2009 (ARRA) provided $115 million to the Department of Energy to help create charging stations throughout the country. The department states it installed more than 18,000 charging outlets with those funds (“History of Electric Vehicles”). In addition, the ARRA allocated $2.4 billion in grants to firms developing advanced battery technology, with $400 million of that total dedicated to the government outright purchasing electric vehicles for testing purposes and further electric vehicle infrastructure investment (“President Obama Announces $2.4 Billion in Grants…”). As seen with the 2008 legislation, the electric vehicle provisions in 2009 were implemented by politicians with electorates heavily impacted by the automobile industry (“About Sandy”). Along with the auto-bailout, the infusion of cash into the auto industry was seen as a way to save jobs or create new ones during a time of considerable lay-offs. Specific attention was paid to states such as Florida and Pennsylvania, key states in presidential elections. John Porcari, then-Deputy Secretary of the Department of Transportation, visited family-owned East Penn Manufacturing Co. in Lyons, Pennsylvania to award a $32.5 million grant for battery investment. Congressman Charlie Dent, a Main Street Partnership and Tuesday Group member representing the state’s politically moderate 15th district, actively supports battery research and hydrogen fuel cell technology. He helped found the House Hydrogen & Fuel Cell Caucus and his website states he is “a leader in promoting tax credits for hydrogen fueling stations and fuel cells” for use in electric vehicles (“Dent Receives Pathfinder Award…”).

The federal government has also provided direct funds to individual car manufacturers in the past. The Energy Independence and Security Act of 2007 (EISA) created the Energy Department’s Energy Advanced Technology Vehicles Manufacturing (ATVM) program, which provides loans to automakers to improve fuel efficiency and electric vehicle development. While the program was granted the ability to loan up to $25 billion, the final tally of loans provided to the five participating companies was valued at $8.4 billion (Hannah). The loans varied in sizes considerably. While Ford Motor Company received almost $6 billion, the Department of Energy granted electric vehicle company Tesla a $465 million loan in 2010 “to establish a manufacturing facility in California” (“History of Electric Vehicles”).

 Recent legislative action in Congress has focused on the electric vehicle tax credit. In addition to making the tax credit function as a rebate for the consumer at the time they purchase a vehicle, the Obama administration proposed increasing the minimum credit from $7,500 to $10,000 to further incentivize electric vehicle purchases. The Republican-controlled Congress refused to consider such changes at the time, and in 2017, considered repealing the tax credit program altogether (Estrada). When the House bill’s removal of Section 30d of the tax code was revealed many key players in the industry voiced their disapproval. In November, GM spokesperson Laura Toole emailed technology website *The Verge* that the company “will work with Congress to explore ways to maintain this incentive” as it helps drive consumer adoption of electric vehicles. The science advocacy nonprofit Union of Concerned Scientists published an article around the same time appealing to Congress to keep the tax credit, explaining how the incentives stimulated the domestic vehicle market. Noting how automakers historically fought safety and health regulations due to higher overhead costs, the organization makes the argument that without federal incentives large corporations will fail to act (Goldman). For decades seat belts, air bags, and fuel efficiency were neglected by automakers due to a lack of obvious profit incentives, and in cases where the public good is being quashed by market considerations, federal regulations can help. The dramatic fall in lithium-ion batteries used by electric vehicles brings the possibility that by the mid-2020s electric vehicles will become cost-competitive with traditionally-powered vehicles without federal incentives, making the credits function mostly to ease the market into the change (Goldman).

Unlike in the House, the Senate version of the Republican tax bill did not remove the vehicle tax credit. During the final meetings regarding the tax bill, industry advocacy group CALSTART sent a letter to Congress signed by over 50 companies stating that the tax credit “spurs U.S. job creation and U.S. leadership in the electric vehicle sector” and that the electric vehicle industry adds over 200,000 jobs into the domestic economy (Blanco). In the end, lobbying from industry groups such the Electric Drive Transportation Association (EDTA), as well as pressure from automakers, eventually saved the program (Spann). In the Tax Cuts and Jobs Act of 2017 signed into law by President Trump, no changes were made to federal policy regarding the automobile industry.

 Electric cars will inevitably reduce the transportation sector’s reliance on gasoline and diesel and put more strain on the nation’s utility companies. Long considered prohibitively expensive, solar energy has become increasingly competitive with oil, coal, and natural gas. For energy providers such as the Tennessee Valley Authority, this presents a challenge to traditional revenue streams and could lead to lower energy costs for American households (Wilson). Energy consumption will be further lowered as states and localities across the nation begin demanding higher energy efficiency standards in the future. The prospects of both cheaper energy and less energy consumption have caused utility companies to see electric vehicles as their solution. “Pacific Gas and Electric, Southern California Edison, San Diego Gas & Electric, and New Jersey’s PSE&G” have already partnered with brands such as BMW, Nissan, and others to offer consumers thousands of dollars in rebates in exchange for the purchase of an electric car (Coren). In a joint letter to Congress sent on March 13 of 2018, 36 large utility companies serving almost every state argue that the vehicle tax credit’s limitations should be removed (Coren). As of 2018 no major automaker has yet to sell 200,000 electric cars in the United States, but GM and Tesla are leading the pack. Once a company hits that milestone, the tax credit will last another six months for that automaker until reductions in the credit eventually eliminate federal support to those manufacturers. Tesla is likely to reach 200,000 electric car sales in the coming months through the popularity of its more affordable Model 3 vehicle, but the law as currently written hurts manufacturers who invested more in electric vehicle technology and sales early on. Essentially due to Tesla’s earlier success, consumers interested in buying electric will have to pay a $7,500 premium in order to buy a Tesla instead of other electric vehicles (Stewart). If light-duty passenger vehicles in the U.S. all became electric, demand for electricity could rise by 20 percent (Denning). Any cap on federal incentives to purchase electric vehicles will mean less revenue for utility companies that have already experienced disappointedly stagnant electricity demand over the past decade.

 The energy industry, however, is still dominated by fossil fuel interests in Congress (“Energy/Natural Resources.”). Electric utilities, for example donated about $5.6 million to Republican candidates in between 2017 and 2018, compared to $3.1 million for Democratic candidates (“Electric Utilities: Money to Congress.”). The partisan split is more acutely felt in the oil and gas sector, where Democrats and liberal groups received about $1.8 million in contributions compared to Republicans and conservative groups’ $9.3 million over the past year (“Oil & Gas: Money to Congress”). “Since the 1990s election cycle, more than two-thirds of [oil and gas] contributions to candidates and party committees has gone to Republicans,” making Republicans much less likely than Democrats to promote alternative energy sources and electric vehicle adoption (Glorioso).

 Beyond tax credits, the perennial problem that has stifled electric vehicles for over a century remains: range anxiety. A Department of Energy-published literature review conducted by researchers at the Argonne National Laboratory suggests that financial incentives at the federal, state, and local level are not enough to drive the electric vehicle market forward. For example, many countries in the European Union have tax credits and rebates available for consumers interested in purchasing electric or plug-in hybrid vehicles, but there is evidence that a lack of electric vehicle charging stations despite incentives—a situation seen in Denmark—means that adoption is still low (Zhou). If governments or private companies plan on waiting for electric vehicle sales to rise before building out an extensive network of charging stations similar to the reach of gas stations today, they will be waiting for a very long time.

While Americans can find comfort in the fact that wherever they go in their gasoline-powered cars, a gas station will be somewhere nearby, long-distance trips with electric vehicles have always been much more difficult to pull-off. According to the Department of Energy’s Alternative Fuels Data Center, there are currently around 18,000 electric charging stations across the country offering almost 50,000 outlets (“Electric Vehicle Charging Station Locations.”). This does not include residential access to electric charging. As detailed earlier, federal funds have improved the electric vehicle charging infrastructure in the past decade, but much more would have to be done in order for electric vehicles to have the same reach as gas stations. In addition, because charging times can vary significantly depending on the output of electricity provided by an outlet, the standard of plug used by the car manufacturer, or the size of the car battery itself, it is difficult for electric vehicles to go on long-distance trips in general.

 Among major automakers, the efforts of Tesla and Volkswagen in building out their own nationwide charging networks stand out. For several years Tesla has built-out a network of charging stations for use with its electric vehicle fleet. The stations, dubbed “Superchargers,” are designed to facilitate rapid recharges of vehicles. A Supercharger can fully charge Tesla’s flagship Model S luxury sedan in about an hour, and according to Time Inc.-owned auto-enthusiast website *The Drive,* can “provide 170 miles of range in 30 minutes” (Adams). 30 minutes is still considerably longer than refilling a gas tank, but it is a speed that Tesla believes environmentally-conscious consumers will be willing to deal with until battery technology improves further. There are around 400 Superchargers in North America currently, with Tesla planning to open new stations frequently (Adams).

 For Volkswagen Group, Tesla’s propriety charging network presents a serious challenge to the company’s ability to sell its own electric vehicles in America. In the wake of the global diesel-emissions scandal, the automaker created a new subsidiary focused entirely on electric charging stations. Aptly-named Electrify America, the company is working alongside Volkswagen-owned Porsche to create a network of 500 fast-charging stations capable of providing “about 20 miles of range for every minute of charge” (Adams). The network is expected to expand to 1,000 stations over the next two years, with Volkswagen hoping to earn revenue from its non-propriety network of charging stations much like a gas company does presently. The massive level of action taken by Volkswagen is contrasted by the *lack* of charging station build-up by traditional American automakers such as GM and Ford. German-based Volkswagen is acting on the belief that investments in electric infrastructure today will benefit its bottom-line in the future, and it may be right. The action by international governments over the last two years, often instigated from Paris Climate Accord pledges and growing economic and health concerns surrounding air pollution, has signaled to the larger car industry that the internal combustion engine’s days are numbered. Volvo Cars, for its part, responded by stating that all vehicles introduced by the Swedish automaker will be “either hybrids or powered solely by batteries” starting as soon as 2019 (Ewing). As another example of Chinese influence over the automobile industry, Volvo is under Chinese ownership, with *The New York Times* speculating that government influence led to such aggressive corporate measures aimed at reducing air pollution (Ewing).

 In lieu of new large-scale federal support from Congress and the White House, automakers have taken to partnering with states to support their electric endeavors. Seven Northeastern states partnered with sixteen automakers to launch a coordinated advertising campaign to encourage electric vehicle adoption (Hawkins). The interest group Alliance for Automobile Manufacturers, which represents GM, Ford, Volkswagen, BMW Group, and Toyota among others, voiced its support for the initiative, which is running under the slogan “Drive Change. Drive Electric.” (Hawkins).

 States can try to implement aggressive electric vehicle policy, but no state can fully match the collective financial and regulatory power of the federal government. Christine Spann, Communications Director for the EDTA, explained in an interview how the lobbying group wants to “ensure that federal infrastructure policy recognizes electric drive as an essential component of 21st century mobility” (Saklad). Americans are much less likely to buy electric if only some states properly support the cars, and therefore “serving a national scale fleet of electric drive vehicles will require adding infrastructure that supports commuter, commercial, regional, and interstate driving needs” through the use of public and private sector collaboration and investment through the power of Congress (Saklad).

 Support for hybrid and electric vehicles by the automobile industry has its limits, however. The Alliance is against the fuel economy limits placed by the Obama-era EPA, arguing that domestic market conditions and technological limitations will essentially force automakers to raise prices throughout their vehicle lineups (“Auto Alliance Statement in Response to EPA's Announcement about the Midterm Review of the Fuel Economy/GHG Program.”). The Trump administration has responded to those concerns by proposing to “freeze fuel-efficiency standards for cars and light trucks at levels now set for model year 2021, keeping them there through 2026” (Mooney, et al.) The changes will allow more leeway for automakers in the short term, but as things currently stand emissions standards are not monolithic. California is able to regulate its own emissions due to a 2011 Obama administration waiver granted under the Clean Air Act (Mooney, et al.). California’s heavily automobile-dependent population of 39 million dwarfs every other state in size by over ten million and represents a larger market than all of Canada, so California’s market power in this area of policy is considerable. To gain access to the state, automakers must have fleets that average 50 miles per gallon by 2025 (Mooney, et al.). States that favor California’s higher standards can currently opt to follow them instead of easier federal guidelines. However, because California Air Resources Board’s ability to contradict federal EPA policy is contingent on the interpretation of federal law taken by the Trump administration, there is considerable concern among environmental groups and corporations funneling resources into electric vehicles that the full-scale rollback will dissipate domestic momentum for green transportation options (Mooney et al.).

 The Auto Alliance’s argument that higher emissions standards will inhibit consumer choice and hurt the domestic auto industry is partially due to the fact that low gas prices have made Americans more eager to spend money on pick-up trucks, mini-vans, and SUVs instead of more efficient cars such as sedans (“Energy & Environment”). However, consumer preferences for large and inefficient vehicles is almost entirely reliant on gas prices remaining low. The Obama administration rules were made due to U.S. automakers placing too much emphasis on large vehicles due to their higher profit margins, but the then-high gas prices caused their sales to fall dramatically (Irfan). The short-term strategizing seen during that time led to catastrophic business failure, and therefore there is risk in investing once again in large vehicles solely because American consumers seem to want them during periods of low fuel prices. The uncontrollable nature of worldwide gas prices makes business decisions based wholly on prices a dangerous proposition for companies, their stockholders, and investors. The momentum behind the electric car industry was enough for Tesla to surpass the stock market value of GM and Ford in 2017, even amidst widely publicized manufacturing hang-ups and lower vehicle sales that haunted Tesla throughout that year (Ewing).

 An urgent matter that will require action on behalf of Congress is finding additional revenue streams for the Highway Trust Fund, which is already suffering from under-funding. The federal fuel tax that funds the program has not risen in decades, and electric vehicle drivers will not have to pay the per-gallon tax anyway. In effect, Congress is giving tax credits for American consumers to buy cars that drive on federal highways that then do not have to pay for the upkeep of such roads. The long-suffering Highway Trust Fund fiasco is reflective of the nation’s crumbling infrastructure, and as the transportation sector starts to become less reliant on gasoline, the situation will only worsen (Golson). Without large-scale federal reform, states will have to implement their own methods to fund important roads and bridges that American rely on. A policy change being implemented by Oregon will tax drivers by the number of miles driven instead of the amount of gas used (Golson). Congress is unlikely to legislatively implement an unpopular tax increase to fund the Highway Trust Fund, but eventually such measures will have to be taken.

 The rise of ride-sharing services has made major automakers aware that future consumers may opt to simply hail a car rather than buy one outright. Lyft Incorporated, for example, hopes to have a self-driving electric vehicle fleet able to provide customers one billion rides per year by 2025 (Cohen). Electric vehicles, which have less moving parts than those equipped with internal combustion engines, would require less maintenance. Autonomous vehicles, additionally, will mean reduced costs to conduct every trip. There are numerous obstacles in the way of such an audacious plan, such as restrictions on the state and city level regarding what types of vehicles are allowed on roads, but as the technology behind electric and autonomous vehicles continues to advance at a rapid clip, companies such as GM, Ford Motors, and Alphabet subsidiary Waymo are investing heavily in order take advantage of what looks to be a rapidly shifting industry (Cohen). The idea of shared, electric, self-driving vehicles traveling through busy city streets might sound far-fetched today, but the possibility of urban vehicular transport becoming greener, cheaper, and less wasteful has attracted the attention of many. For car companies to keep up, the possibility of switching some of their business from traditional purchases to more of a transportation provider is radical, but forward-thinking.

 The future of transportation is in flux, and it is imperative that Congress takes further action now. The United States remains one of the largest markets in the world for passenger vehicles, and it is in the best economic interests of the country that America leads in battery development and electric vehicle adoption before cheaper, foreign competitors overrun the domestic automobile market and devastate American manufacturers. Tax credits, rebates, infrastructure build-up, and targeted appropriations for research and development should not only continue but increase. A lack of action by Congress today will undoubtedly cause great damage in the future.

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