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Drive Down to Electric Avenue: Taking Electric Vehicle Incentives Higher

Andrew Rabalais

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INTRODUCTION

Elon Musk had one mission when he founded Tesla Motors Inc. in 2004: to revolutionize the worldwide car industry—by significantly accelerating the advent of a mostly electric-car world—in order to help humanity take a huge leap toward a sustainable-energy future.[1] Since then, Tesla has created the most successful electric vehicle in the automobile industry.[2] The Tesla Model S has become an enormous success, blowing the automotive industry away with a Consumer Report's rating of 99/100, a National Highway Safety Administration rating of 5.4/5—both the highest ever—and the ability to go 280 miles on a single charge.[3]

However, the biggest issue surrounding the Model S is that most people cannot afford one.[4] Further, the main concern with the affordable electric vehicles (EVs) in today's market is that they do not go very far per charge. As today's EVs are new and different, they are not yet widely understood. Increased commercial availability and reduced costs are necessary for widespread use and acceptance of these vehicles. EVs, as an alternative to the conventional internal combustion engine (ICE) vehicle, will help the United States: (1) reduce dependence on foreign oil; (2) compete globally for private investment, jobs, and exports; and (3) help decrease its growing energy needs.

The current, low price of gasoline has led to overproduction and overconsumption of conventional vehicles.[5] These distortions have influenced the sprawling development of American society through widespread car ownership. As a result, Americans living in most cities must rely heavily on cars as their main form of transportation.[6] Not only does the low price of gasoline help keep car ownership high, but it also decreases consumer demand for fuel-efficient vehicles.[7] The cost of reducing the use of fossil fuels—particularly in major industrialized

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1. Elon Musk, *The Mission of Tesla*, TESLA (Nov. 18, 2013), teslamotors.com/blog/mission-tesla.
2. *See* ASHLEE VANCE, ELON MUSK: TESLA, SPACEX, AND THE QUEST FOR A FANTASTIC FUTURE 152 (2015).
3. *See id.* at 268.
4. The Model S has a starting MSRP of $71,000. However, including add-ons, such as a better battery or other features, could raise the price to nearly $100,000.
5. Evan N. Turgeon, *Triple-Dividends Toward Pigovian Gasoline Taxation*, 30 J. LAND, RESOURCES & ENVTL. L. 145, 147 (2010).
6. *Id.*
7. *Id.*

nations—is enormous.[8] Fossil fuels are paramount to heating homes, running our vehicles, and providing us with electricity. Unfortunately, there exists a finite amount of fossil fuels. Eventually, the entire supply will be depleted. Moreover, this reliance on fossil fuels carries with it the potential to cause a massive economic collapse. At some point in the future, there will be no choice but to stop running everything on fossil fuels, as they will either be gone or too expensive.

The federal government has used tax incentives to achieve its social, economic, and political goals since the inception of the income tax.[9] Properly structured tax incentives for EVs can play a valuable role in moving the U.S. towards a clean, renewable, and sustainable energy future. Currently, the federal government offers an income tax credit for purchasing an EV, along with the additional incentives offered by individual states.[10] These incentives are in place to encourage buyers to purchase a vehicle that will serve the public good.

Part I of this Comment describes the electric car industry and discusses the benefits of using the technology. Part II analyzes the theories behind existing tax policies intended to influence behavior, and introduces and explains the operation of the current federal tax credit for purchasing an EV. Specifically, it discusses the tax credit's history and the direction it could take in the future. Part III explores issues related to EVs, explaining how the tax benefits the rich, how EV users are not burdened with the gas tax, and how the use of fossil fuels for electricity used by EVs is impactful on the industry. After introducing these core issues, this section presents possible solutions. Part IV assesses how a select group of states have implemented their own policies by providing an in-depth analysis of the economic and financial impacts of these tax incentives. Part V balances a number of relevant factors to identify the ideal federal and state policies for incentivizing the purchase and use of electric vehicles and discusses what roles both state and federal governments, respectively, should play in directly and indirectly incentivizing this new industry.

I. BACKGROUND

Although the electric car seems to be new technology, its inception and implementation dates back to the mid-19th century. In order to

8. *See generally*, THE NAT'L ACADEMIES OF SCIENCES, ENG'G, & MED., WHAT YOU NEED TO KNOW ABOUT ENERGY: SUPPLY AND DEMAND (2008), nap.edu/reports/energy/supply.html [https://perma.cc/NCA9-3RZM].

9. Mona Hymel, *The United States' Experience with Energy-Based Tax Incentives: The Evidence Supporting Tax Incentives for Renewable Energy*, 38 LOY. U. CHI. L. J. 43, 46 (2006).

10. I.R.S. Notice 2009-89, 2009-48 I.R.B. 714.

adequately address the issues surrounding EVs, the history and benefits of EVs must first be understood.

A. History of Electric Vehicles

In 1835, American Thomas Davenport built the first electric vehicle, a small locomotive.[11] William Morris followed, building the first successful electric automobile in 1891.[12] By 1900, 28% of vehicles in the U.S. were powered by electricity.[13] However, during the 1920s, desire to travel longer distances, the early EVs' lack of horsepower, and the easy availability of gasoline, made the EV increasingly obsolete.[14] However, in the late 1960s and early 1970s, as gas prices rose and a gas shortage emerged, this trend reversed, and America began to search for ways to lower its dependence on foreign oil. In response, Congress passed the Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976, authorizing the Department of Energy to conduct research and development in the area of electric and hybrid vehicles.[15]

A renewed interest in EVs emerged due to the environmental impact of petroleum transportation and the continuing increase in oil prices.[16] However, the EVs created in this period failed to perform favorably when compared to internal combustion engine cars, as they only had a range[17] of forty miles, and a maximum speed of only forty-five miles per hour.[18] Again, there was renewed interest in the 1990s when the Clean Air Act Amendment of 1990 and the Energy Policy Act of 1992[19] were passed. More importantly, in the coming years, two other events sparked the revival of EV interest. First, in 1997, the Toyota Prius became the world's first mass-produced hybrid electric vehicle.[20] Then, in 2006, Tesla Motors began producing a luxury electric sports car that could be driven 200 miles

11. *Timeline: History of the Electric Car*, PBS (Oct. 30, 2009), pbs.org/now /shows/223/electric-car-timeline.html [https://perma.cc/9X5Q-KFLG].
12. *Id.*
13. *Id.*
14. *Id.*
15. U.S. DEP'T OF ENERGY, *Timeline: History of the Electric Car* (Sept. 15, 2014, 10:14 AM), energy.gov/articles/history-electric-car [https://perma.cc/BZ85-LRCV] [hereinafter *History of the Electric Car*].
16. Dr. Ulrich Eberle & Dr. Rittmar von Helmolt, *Sustainable Transportation Based on Electric Vehicle Concepts: A Brief Overview*, 3 ENERGY & ENVTL. SCI. 689 (2010).
17. The "range" is the distance that an electric car is able to be driven before it must be recharged.
18. *History of the Electric Car*, *supra* note 15.
19. *See* Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776 (1992).
20. *History of the Electric Car*, *supra* note 15.

on a single charge.[21] In response, a number of additional automobile manufacturers began producing their own EVs, leaving consumers with more options than ever in the EV market. A number of different types of EVs exist today, and it is important to distinguish between them and the different capabilities and benefits they offer. This Comment will address the three most popular types of EVs: hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery electric vehicles (BEVs).

HEVs use an ICE—just like a conventional car—but they also uses an electric motor that captures energy normally lost through braking and coasting, also known as regenerative braking.[22] By capturing this energy, HEVs can travel further than a similar conventional vehicle on the same tank of gas.[23] HEVs, however, cost more than conventional cars, and although owners save money in fuel costs, it can take years before the savings outweigh the initial premium. The Toyota Prius is the most well-known car of this type.[24]

PHEVs have both an electric engine and an ICE.[25] A PHEV can recharge its battery both through regenerative braking and plugging in to an external power source.[26] Once the electric battery has depleted, the combustion engine kicks in and runs on gas.[27] PHEVs are capable of traveling between ten to forty miles before their gas engines are turned on.[28] The most popular type of PHEV is the Chevy Volt.

Lastly, BEVs[29] have fully electric engines and must be recharged. The charging of BEVs is accomplished by plugging the vehicle into the electric

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21. *Tesla Roadster Review*, PLUGIN CARS, plugincars.com/tesla-roadster [https://perma.cc/FK9X-KU4F] (last visited Apr. 4, 2017).

22. U.S. DEP'T OF ENERGY, *Alternative Fuels Data Center*, afdc.energy.gov /vehicles/electric_basics_hev.html [https://perma.cc/5ZPW-JZWE] (last visited Apr. 4, 2017) [hereinafter *Alternative Fuels Data Center*].

23. *Id.*

24. *See*, John C.K. Pappas, *A New Prescription For Electric Cars*, 35 ENERGY L. J. 151, 154 (2014).

25. *Alternative Fuels Data Center*, *supra* note 22.

26. *Types of Electric Vehicles,* EVGO, evgo.com/why-evs/types-of-electric-vehicles/ [https://perma.cc/G2FQ-P4LM] (last visited Apr. 4, 2017).

27. *Alternative Fuels Data Center*, *supra* note 22.

28. *See* UNION OF CONCERNED SCIENTISTS, *How Do Plug-in Hybrid Hybrid Electric Cars Work?*, ucsusa.org/clean-vehicles/electric-vehicles/how-do-plug-in-hybrid-electric-cars-work#.WOuqzBiZOV4 [https://perma.cc/W74D-9XJT] (last visited Apr. 4, 2017). Cumulative global sales totaled about 1,004,000 highway legal plug-in electric passenger cars and light-duty vehicles by mid-September 2015. Jeff Cobb, *One Million Global Plug-In Sales Milestone Reached*, HYBRIDCARS.COM, Sept. 16, 2015, hybridcars.com/one-million-global-plug-in-sales-milestone-reached/ [https://perma.cc/HVG4-AHST].

29. This Comment will mostly be concentrated on battery electric vehicles, as these seem to have the most potential in terms of popularity and effect.

power grid. Models include the Nissan LEAF, Chevy Volt, and Model Tesla S.[30]

B. Benefits of Electric Vehicles

EVs provide a wide range of benefits. This Comment explores both the large-scale societal benefits of EVs, as well as the consumer benefits of EVs.

1. Large-Scale Benefits

Aside from benefits for individual consumers, the most drastic and perhaps most important benefits of EVs are those they provide to society. Along with fuel efficiency and other conservation measures, EVs offer an opportunity for the U.S. to reduce oil consumption, to help consumers and businesses lower fuel costs, and to become a global leader in the production, deployment, and export of new technologies.[31] All EVs share two benefits compared to ICE cars—reduced climate change inducing greenhouse gas emissions and reduced dependence on oil.[32]

a. Energy Security

It is important for the U.S. to reduce its dependence on foreign oil. Recognizing the need to diversify U.S. energy sources, the American government has invested in energy-efficient programs and has incentivized the use and development of alternative and renewable fuel sources. In the U.S., 81% of total energy comes from oil, coal, and natural gas, all of which are fossil fuels.[33] The U.S. imports millions of barrels of crude oil and refined petroleum products each day.[34] This amounts to sending billions of dollars to foreign countries, some of which are hostile to U.S. interests.[35] The production of crude oil is becoming increasingly scarce and more expensive. If America's vehicle fleet could become more

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30. *See* Cobb, *supra* note 28.

31. PEW CHARITABLE TRUSTS, *Electric Vehicles Can Help Reduce U.S. Oil Dependence*, Care2, Aug. 2, 2012, care2.com/causes/electric-vehicles-can-help-reduce-u-s-oil-dependence.html [https://perma.cc/KFD7-BYXV].

32. Pappas, supra note 24, at 163.

33. THE NAT'L ACADEMIES OF SCIENCES, ENG'G, & MED., *What You Need to Know About Energy: Fossil Fuels*, needtoknow.nas.edu/energy/energy-sources/fossil-fuels/ [https://perma.cc/4437-NUE8] (last visited Apr. 4, 2017).

34. *See generally* U.S. ENERGY INFO. ADMIN., *Petroleum & Other Liquids: U.S. Imports by Country of Origin*, eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_m.htm [https://perma.cc/N36J-T6J5] (last visited Apr. 4, 2017).

35. PEW CHARITABLE TRUSTS, *supra* note 31.

efficient by relying on alternative sources of fuel, such as electricity, the U.S. could reduce its dependence on oil and avoid possibilities of severe economic and security threats.[36] Electrified drivetrains,[37] which are used in EVs, can eliminate the need for petroleum use in vehicles by replacing it with power from an ever-cleaner electricity grid.[38] Plug-in electric vehicles are powered by electricity produced primarily by domestic sources such as coal, natural, nuclear, and renewable sources.[39] As the U.S. increases its use of renewable and sustainable energy sources, energy security will be improved.

b. Environmental Stability

In properly structuring an EV policy, it is important to compare EVs to conventional cars regarding emissions and oil consumption to show that pursuing EVs is worthwhile.[40] While not an easy task, transitioning the U.S. transportation system to depend primarily on electricity as opposed to gasoline will be a major step toward a renewable, sustainable energy future.[41] The cumulative emissions of an EV, including emissions from vehicle production and electricity generation, are significantly lower than emissions from a gasoline vehicle.[42] Specifically, gas cars emit 157 pounds of CO2 per million BTUs[43] of energy consumed, while EVs emit only 76 pounds of CO2 per million BTUs of energy consumed.[44] Therefore, even

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36. PEW ENV'T GROUP, *Electric Vehicles: Reducing Foreign Oil Dependence, Enhancing U.S. Competitiveness and Decreasing Pollution* (2011), pewtrusts.org/~/media/assets/2011/05/11/electric-vehicles--final.pdf [https://perma.cc/D4VK-FJGF].

37. A drivetrain is the group of components within a motor vehicle that deliver power to the driving wheels.

38. *See* PLUG IN AMERICA, *The Promotion of Electric Vehicles in the United States*: *A Landscape Assessment* (2015), provedor.nuca.ie.ufrj.br/estudos/plug1.pdf [https://perma.cc/MH95-V2Q8].

39. Kristy Hartman, *State Efforts Promote Hybrid and Electric Vehicles*, NAT'L CONFERENCE OF STATE LEGISLATORS, Dec. 3, 2015, ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx [https://perma.cc/FY4T-22VD].

40. Pappas, supra note 24, at 163.

41. Elizabeth Ridlington & Travis Madsen, *Driving Cleaner: More Electric Vehicles Means Less Pollution*, ENV'T CAL. RESEARCH & POLICY CTR. (2014), environmentamericacenter.org/sites/environment/files/reports/EA_drivingcleaner_scrn.pdf [https://perma.cc/8URZ-MDVH].

42. *Id.*

43. BTU: British Thermal Unit. It is the amount of work needed to raise the temperature of one pound of water by one degrees Fahrenheit. U.S. ENERGY INFO. ADMIN., *British Thermal Units (Btu)* https://www.eia.gov/energyexplained/index.cfm/index.cfm?page=about_btu [https://perma.cc/HV9P-DV45] (last updated Dec. 15, 2014).

44. Ridlington & Madsen, *supra* note 41.

after factoring in emissions from fossil-fuel burning plants that generate electricity for EV batteries, gas cars emit at least twice as much CO2 as electric cars.[45]

In addition to contributing to climate change, automobile pollution can be detrimental to our health. The emissions released from ICE vehicles contribute to the formation of smog pollution, which can cause harm similar to sunburns on the inside of the lungs.[46] The total pollution impact of ICE vehicles can be compared to those of EVs by measuring life cycle emissions.[47] Life cycle emissions include pollution emitted during vehicle production and transportation, and pollution that is released when the fuel is used.[48] Analyses performed by different government agencies, academics, and other researchers have confirmed that EVs have lower life cycle emissions than conventional gasoline vehicles, even when charged from a grid heavy with coal-fired power plants.[49]

c. Economic Development

The potential for the U.S. to take a leadership role in a technology of vast significance should not be ignored. Investment in new technologies has the potential to create a flurry of new jobs in green-technology markets such as advanced battery design and production.[50] If tax incentives are capable of spurring consumer demand for EVs, they should be similarly effective in stimulating the commercialization of advanced technologies and driving private sector investment in advanced battery technology, strengthening the U.S.'s position as a world leader in 21st century technology.[51] Bloomberg New Energy Finance, which analyzes clean energy markets, estimates that the advanced battery industry alone "could reach $100 billion annually by 2030."[52] Indeed, demand for EVs has already resulted in new battery and component manufacturing facilities across the U.S.[53]

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45. *Comparing Emissions and Efficiency in Electric Cars and Gasoline Cars*, LIGHTS ON SOLAR (Oct. 10, 2014), lightsonsolar.com/emissions-and-efficiency-in-electric-cars-versus-gasoline-cars/ [https://perma.cc/EM8L-NS2N].

46. Ridlington & Madsen, *supra* note 41, at 9.

47. *Id.* at 14.

48. *See* U.S. Dep't of Energy, *Ethanol Vehicle Emissions*, afdc.energy.gov /vehicles/flexible_fuel_emissions.html [https://perma.cc/7GPL-N736] (last visited Apr. 19, 2017).

49. Ridlington & Madsen, *supra* note 41, at 14.

50. PEW CHARITABLE TRUSTS, *supra* note 31.

51. Turgeon, *supra* note 5, at 171.

52. PEW CHARITABLE TRUSTS, *supra* note 31.

53. For example, in 2011, General Motors announced that they will double production of the Chevy Volt.

2. Consumer Benefits

Former EV myths—for example, that EVs cover limited driving distances or that they require frequent, extended periods of recharging battery power—are quickly being dispelled by recent EV models. These misconceptions generally only apply to the first marketed models.[54] EVs such as the Tesla Model S are able to go over 280 miles on a single charge—almost as far as a conventional car typically gets on a tank of gas.[55] Consumers have found that accessing electricity to charge their vehicles has proven significantly less burdensome than was initially envisioned.[56] Concerns regarding long BEV recharge times have been proven largely inaccurate in real world experience.[57] As a result of busting these myths, there has been a substantial increase in growth for EVs, with the number of EVs on U.S. roads between June 2013 and June 2014 growing roughly 100%, from 111,962 to 222,590.[58]

As technology improves, purchasing and driving an EV becomes more practical. EVs offer consumers a number of benefits, including dramatically lower operating costs, significantly reduced impact on the environment, the convenience of "fueling" at home, and the pleasure of a better driving experience.[59] Not only are EVs cheaper to operate, but they are less expensive to maintain; they do not require oil changes, their brakes often last longer, and they have fewer mechanical parts to fix or replace.[60] A potential buyer also has more options now than ever before, as the increasing demand for EVs has led to an increasing number of manufacturers producing their own EV. Since the introduction of the modern EV, the marketplace for EVs has boomed with demand, with over two dozen models available at the beginning of 2015.[61]

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54. Kara Virji-Gaidhar, *Tax Credit for Qualified Plug-in Electric Drive Motor Vehicle Purchases*, 3 CONTEMP. TAX J. 50, 60 (2014).

55. GREEN CAR CONGRESS, *EPA Rating for 85 kWh Tesla Model S: 89 MPGe, 265-Mile Range* (June 21, 2012), greencarcongress.com/2012/06/models-20120621 [https://perma.cc/Y4EN-TBXJ].

56. PLUG IN AMERICA, supra note 38, at 3.

57. *Id.*

58. *Id.* at 2.

59. *Id.* at iii.

60. Eric Loveday, *Study: Electrics 35% Less Costly to Maintain than Comparable Gas Vehicles*, PLUGIN CARS (Dec. 18, 2012), plugincars.com/study-electrics-35-less-costly-maintain-comparable-ice-vehicles-125755.html [https://perma.cc/LG4Q-VWJF].

61. PLUG IN AMERICA, *supra* note 38, at 1.

a. Drawbacks

Currently, the preeminent drawback of the EV is the initial price of the vehicle. Due to their higher price, most EVs are often considered luxury vehicles. Because of differences in vehicle design and technology, EVs cost thousands of dollars more to purchase than conventional vehicles of comparable size and performance. Despite the high initial price of some EVs, these costs are usually recovered through fuels savings, a federal tax credit, and state incentives.[62] However, in some cases, fuel savings do not overcome the initial price differential. Factors such as vehicle ownership period, annual vehicle use patterns, and EV price and specifications help determine whether all costs can be recovered.[63]

Another drawback of EVs is the limited availability of places to charge them. The price of gasoline has not been high enough to drive significant consumer demand for alternative vehicles. Further, the U.S. has developed a massive refueling and manufacturing infrastructure for ICE cars, while the number of refueling stations for EVs remains limited,[64] making their use inconvenient for the average consumer. The availability of charging stations is largely dependent on the growth of the EV market share. Charging stations and financial incentives for EVs have presented a chicken and the egg conundrum: charging station availability has long been considered a key to helping potential EV drivers get over "range anxiety"—that is, the fear that their car will run out of power—but without car volume, many who would otherwise install the pricey chargers are reluctant to do so. Increased support for and investment in public recharging stations offers the highest benefit to potential EV consumers.

II. THE FEDERAL ELECTRIC VEHICLE TAX CREDIT

A proper analysis of both the federal and state tax credits for EVs requires an understanding of how legislators can use tax policies to encourage certain behavior.

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62. WASH. STATE DEP'T OF TRANSP., *Washington State Electric Vehicle Action Plan: Increasing Adoption of Plug-In Electric Vehicles* (2015), wsdot.wa.gov/NR/rdonlyres/9D25F338-C439-4EA3-858C-C25959E96EF2/0/EV_Action_Plan_Fact_Sheet.pdf [https://perma.cc/T45N-47NV].

63. Lingzhi Jin et al., *Evaluation of State-Level U.S. Electric Vehicle Incentives*, INT'L COUNCIL ON CLEAN TRANSP. (2014), theicct.org/sites/default/files/publications/ICCT_state-EV-incentives_20141030.pdf [https://perma.cc/BL5P-YDNU].

64. Eric Schaal, *These Maps Show the State of Electric Vehicle Charging in 2016*, FLEETCARMA (Sep. 27, 2016), http://www.fleetcarma.com/electric-vehicle-charging-2016-maps/ [https://perma.cc/5XE6-Q48E].

A. Case for a Policy

Purportedly, the primary function of the tax system is to raise revenue for the government to use for the public good.[65] However, the government also uses taxes to encourage beneficial activities and to limit undesirable behavior. In forming a tax policy, policymakers seek to "design a tax structure that minimizes the loss in economic efficiency due to taxation in a matter that reflects society's attitude towards equity and efficiency."[66] The equity of a tax speaks to the distribution of the tax, with a goal of raising the maximum revenue and minimizing cost.[67] Efficiency, in economic theory, considers the social cost of raising revenue and attempts to minimize tax liability when given different financial decisions.[68]

An optimal tax theory seeks to minimize the distortion taxes cause on the allocation of resources.[69] These distortions are referred to as market failures, which drive the market to inefficient outcomes.[70] Where allocation of resources is not ideal, externalities exist. Externalities "are a common example of market failure, and occur when the market price fails to reflect all the costs or benefits associated with activity."[71] Economists often point to pollution and the effects of burning fossils fuels as an example of an externality.[72]

Policymakers will often utilize tax incentives when attempting to deal with financial, institutional, and information obstacles that impede the advancement of public good. These policymakers must focus on identifying features of the various tax incentives that correlate positively with the goal of stimulating technology, investment, and public acceptance for renewable energy sources, energy conservation, and increased efficiency of traditional energy technologies.[73] Taxes are generally a fiscal tool to discourage activity; however, a tax credit can be an example of an incentive. A tax credit allows taxpayers to reduce the taxes they owe to the government through spending.[74]

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65. See JONATHAN GRUBER, PUBLIC FINANCE AND PUBLIC POLICY 125 (Leo Kelly, et al. eds., 3rd ed. 2011).
66. Eric M. Zolt, *The Uneasy Case for Uniform Taxation*, 16 VA. TAX REV. 39, 42 (1996).
67. *See* Linda Sugin, *A Philosophical Objection to the Optimal Tax Model*, 64 TAX L. REV. 229, 229 (2011).
68. *See id.*
69. Zolt, *supra* note 66, at 69.
70. GRUBER, *supra* note 65.
71. Zolt, *supra* note 66, at 63.
72. *See* GRUBER, *supra* note 65.
73. *See* Hymel, supra note 9, at 64–76.
74. *Id.*

The notion of using the tax system as a mechanism for correcting externalities was first posited by economist A.C. Pigou.[75] Pigou advocated the "increase [of] the price of a good or service to reflect its true cost, thereby decreasing consumption to the economically optimal level."[76] "The proper corrective device is a Pigovian tax, equal to marginal social damage levied on the generator of the externality."[77] Pigovian taxes are an attempt to correct economic efficiencies caused by distortions.[78] By establishing tax credits for EV purchasers, consumers will be incentivized to purchase a vehicle that will reduce polluting emissions, and thereby correcting a negative externality. A Pigovian tax thus has the potential to improve societal welfare.

B. Application of Tax Credit

Tax credits are one tool that policymakers have adopted to pursue the goals of decreasing petroleum consumption and greenhouse gas emissions in the transportation sector.[79] In deciding whether to purchase an EV, consumers are faced with the trade-off between high price and low operating cost, as compared to other types of vehicles. An EV tax credit put into place would offset some of the vehicle's higher purchase price. Accordingly, the U.S. Energy Policy Act of 2005, which established a tax credit for those who purchased a hybrid electric vehicle, first rewarded purchasers of EVs with a tax credit to reduce that individual's tax burden.[80] The law was in effect before the first PHEV models hit the market and was limited to 60,000 vehicles per manufacturer, spanning multiple years.[81] Subsequently, the Energy and Improvement Act of 2008,[82] slightly changed by the American Recovery and Reinvestment Act of 2009, created an updated and more extensive tax credit for EVs.[83] This tax credit was worth $2,500, plus $417 for each kilowatt-hour of traction battery capacity over 4 kilowatt-hours, capped at $7,500.[84] Today, all EVs qualify

75. Zolt, *supra* note 66, at 70.
76. Turgeon, *supra* note 5, at 146.
77. WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 23 (2nd ed. 1988).
78. Zolt, *supra* note 66, at 70.
79. *See* CONG. BUDGET OFFICE, EFFECTS OF FEDERAL TAX CREDITS FOR THE PURCHASE OF ELECTRIC VEHICLES [hereinafter FEDERAL TAX CREDITS] (2012).
80. U.S. Energy Policy Act of 2005, Pub. L. No 109-58, 199 Stat. 1047.
81. *Id.*
82. Energy Improvement and Extension Act of 2008, Pub. L. No. 110-343, 122 Stat. 3765.
83. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115.
84. *See* Pappas, *supra* note 24, at 183.

for the full $7,500.[85] Also, each manufacturer is allowed a threshold of 200,000 plug-in vehicles to sell in the U.S. before the tax credit is phased out.[86] According to the Congressional Budget Office (CBO), between 2012 and 2019 the federal government will spend $7.5 billion on policies to boost the U.S. electric vehicle industry, primarily in the form of the federal tax credit.[87]

Former President Barack Obama voiced concerns about the lack of available clean energy, and made them known though the Obama Administration Clean Power Plan.[88] In the 2011 State of the Union Address, President Obama called for 1 million plug-in electric vehicles to be on the road by 2015.[89] He also pledged that his administration would give $2.4 billion in federal grants to continue the research and development of next-generation batteries and vehicles.[90] In 2015, President Obama proposed both the idea of raising the federal tax credit cap to $10,000 and the idea of a point-of-sale rebate.[91] Although the administration fell short of its stated goals, these actions stand as recognition of the potential benefits of EVs and a step towards realizing those benefits.

C. How the Tax Credit Works

EV purchasers will not feel the benefit of the current EV tax credit when they make their purchase; instead, the benefit will be conferred when they file their annual income tax returns.[92] Specifically, the tax credit is subtracted from the amount of federal income tax that the buyer owes.[93] Unfortunately, if the amount of credits exceeds the amount of the buyer's tax liability, then the buyer does not receive the difference, as the credit is non-refundable.[94] Therefore, individuals with a low tax liability are unable

85. *Id.*
86. *Id.*
87. FEDERAL TAX CREDITS, *supra* note 79, at iii.
88. WHITE HOUSE: PRESIDENT BARACK OBAMA, *A Historic Commitment to Protecting the Environment and Addressing the Impacts of Climate Change*, obamawhitehouse.archives.gov/the-record/climate [https://perma.cc/ZYM6-UBCW] (last visited Apr. 9, 2017).
89. Brad Tuttle, *So About That Goal of 1 Million Electric Cars by 2015*, TIME, Jan. 22, 2015, time.com/money/3677021/obama-electric-cars-gas/ [https://perma.cc/XKH8-KC9A].
90. *Id.*
91. Jeff Cobb, *Does The $7,500 Plug-In Car Tax Credit Need Reform?*, HYBRIDCARS.COM, Mar. 6, 2015, hybridcars.com/does-the-7500-plug-in-car-tax-credit-need-reform/ [https://perma.cc/RB5F-M2YT].
92. Virji-Gaidhar, *supra* note 54, at 60.
93. *Id*. at 56.
94. *Id*. at 55.

to realize the full benefit of the tax credit, and will thus only realize a fraction of the value.[95]

The EV tax credit has both direct and indirect effects. The credit's direct effect is to subsidize EV purchases, as those who purchase EVs will use less gasoline and produce fewer greenhouse gases emissions.[96] This, in turn, provides the societal benefit of working to correct the negative externality of pollution. The estimates of the cost to the government can vary widely, as it is difficult to determine exactly how much gasoline consumption and emissions are being avoided. However, the indirect effect of the EV tax credit is that it allows automakers to sell more low fuel economy vehicles and still comply with the federal standards that govern the average fuel economy of the vehicles they sell.[97]

D. Should the Government Be Involved?

The issue of implementing an effective tax credit is two-fold; first, it must be determined whether these incentives are helping to propel the EV industry; and, second, it must be determined whether the benefits provided by this industry are significant enough to justify such action. Although the benefits of the tax credit are numerous, the question remains as to whether the U.S. is taking the ideal course of action to meet its stated goals in both the short and long term. It is necessary, in the context of government subsidies, for the benefits of the subsidies to outweigh their costs. Some argue that it is best to leave the survival and prosperity of EVs for the market to decide. Conversely, others argue that the government should be involved, seeing as EVs promote the public good of decreased pollution and increased energy security. One commentator summed up the argument by stating:

95. FEDERAL TAX CREDITS, *supra* note 79, at 3.
96. *Id.* at iii–iv.
97. Cobb, *supra* note 91.

> Many argue that the U.S. government should not be in the business of subsidizing or promoting technologies. Governments, they argue, are inherently inefficient compared to the market, and having the government choose winners and losers leads to the wrong ones winning. While this is a convincing argument for private goods, the most important benefits of EVs are public goods, meaning that the market fails to value them correctly, leading to market failure and necessitating government involvement for the benefit of the public.[98]
>
> In sum, because the benefits of EVs are public goods, and only the government by representing the collective interests of the people will protect those nation-enhancing benefits, the US government is justified in supporting EVs.[99]

III. ISSUES SURROUNDING CURRENT ELECTRIC VEHICLE INCENTIVES

Currently, there exist several major issues pertaining to EVs. Notable among these are the tax credit's disparate benefit to rich over poor, the ability of EV users to avoid the gas tax, and the impact of fossil fuels used to generate the electricity EVs use. This section first introduces these issues, and then identifies possible solutions.

A. Rich vs. Poor

Although citizens of all income levels may benefit from the tax credit, critics have observed that it has often favored higher wage earners.[100] Structuring the subsidy as a tax credit instead of a rebate reduces its benefit to lower earners; it requires that one pay a certain minimum level of taxes in order to realize the credit's full amount.[101] For individuals with lower tax liabilities, the credit is capped, as the most someone can do under the current structure is reduce their regular income tax liability to zero, rather than receiving an additional rebate for the remainder of the credit's value.[102] Quantification of this inequity among income levels requires an application of vertical and horizontal concepts.[103] The principle of vertical

98. Pappas, supra note 24, at 190.
99. Pappas, supra note 24, at 191.
100. Cobb, *supra* note 91.
101. *Id.*
102. *See* Aaron Crowe, *Is $7,500 Tax Incentive Enough to Sell Electric Cars?*, CHEAP CAR INS., July 1, 2014, cheapcarinsurance.net/is-7500-tax-incentive-enough-to-sell-electric-cars/ [https://perma.cc/3ZJ7-DDMF].
103. LIAM MURPHY & THOMAS NAGEL, THE MYTH OF OWNERSHIP TAXES AND JUSTICE 12–13 (2002).

equity in tax policy dictates that groups with more resources should pay higher taxes than groups with fewer resources.[104] Horizontal equity, on the other hand, is the principle that individuals across all levels of income should be taxed similarly.[105]

Accordingly, the tax credit favors those who are wealthy, as someone in a lower tax bracket will not receive the full benefit. Because the purpose of the tax is to encourage pollution reduction through the use of EVs and sustainable energy, as opposed to providing a tax reduction device to the wealthy when they purchase an EV. [106] As a result, the U.S. system of income taxation is progressive, and the effect of the non-refundable tax credit is not vertically equitable across all marginal income tax brackets. Low-income taxpayers in the 10% and 15% income tax brackets are unlikely to benefit from the tax credit because they do not have the necessary tax liability.[107]

1. Solutions

One possible solution to this inequity is the implementation of a point-of-sale rebate. The Obama administration proposed this idea to Congress in its 2014 budget proposal by assigning the tax credit benefit to EV dealerships.[108] A point-of-sale rebate would allow purchasers to receive the entire EV tax credit up front, thereby shifting the inefficiency of capturing the tax credit to the dealerships through the process of filing their business taxes.[109] This plan would allow consumers to realize the full amount of the tax credit immediately—instead of waiting until they file their taxes—theoretically increasing consumer receptiveness to purchasing an EV. A second solution would be to span the tax credit out over a number of years. To illustrate, if one's tax liability was less than the credit amount received for their purchase of an EV, in the year of the purchase, the credit would rollover to be used on the following year's tax liability, instead of losing out on the extra non-refundable credit entirely.

B. Gas Tax

EV drivers are not currently burdened with the gas tax, which is used for the upkeep of roads and highways. Currently, when someone buys gasoline, the federal government taxes 18.4 cents per gallon of unleaded

104. GRUBER, *supra* note 65.
105. *Id.*
106. *Id.*
107. Virji-Gaidhar, *supra* note 54, at 60.
108. *Id.*
109. *Id.*

gas and 24.4 cents per gallon of diesel.[110] This money, which goes into the Highway Trust Fund (HTF), is distributed to the states for maintenance and construction of our highways.[111] As an increasing number of drivers switch to EVs, the amount of gas being used decreases, taking with it funding for the HTF.[112] This either leaves the cost of funding the HTF to be passed on to drivers of gas-powered engines, or will cause the amount of money for the maintenance and construction of roads to slowly dwindle. Accordingly, an increasing number of drivers are no longer subject to the gas tax, despite the fact that EVs create just as much wear and tear on the roads as gas-powered cars. Some argue that it is not fair that EV drivers are receiving the full benefit of these government funds despite a lower overall gas tax burden. Critics argue that a driver should pay for the wear and tear that he or she creates.[113]

1. Solutions

Highway maintenance should remain a priority. As such, the HTF must receive adequate funding—even in times of decreasing gasoline consumption. The gas tax—which has not been raised since 1993, when it represented about 17% of the cost of a gallon of gas[114]—has been declining as a percentage of price per gallon for decades.[115] In 1993, the average gallon cost $1.07; yet, today that figure sits at $3.54, only 5% of the cost.[116] The easiest way to increase the funding of the HTF is to increase the tax to mirror the increased price of gas. Further, such an increase would have the Pigovian effect of incentivizing drivers to move away from conventional cars and toward EVs. Since EV drivers do not purchase gas, and thus are not contributing to the HTF by way of the gas tax, one potential solution would be to impose a flat fee on EV drivers every year for their contribution to the HTF. However, this strategy risks inequity, as those who drive more frequently would realize a greater benefit from their

110. Daniel Gross, *The Electric Slide*, SLATE (Apr. 13, 2015), slate.com/articles/business/the_juice/2015/04/georgia_passes_200_electric_car_fee_why_are_states_punishing_people_for.html [https://perma.cc/B5UM-3327].

111. *See* Pub. L. No. 109-59, 119 Stat. 1144 (Aug. 10, 2005); *See* U.S. GOV'T ACCOUNTABILITY OFFICE, *Highway Trust Fund Obligations, Fiscal Years 2009 to 2011*, GAO-13-193R (Jan. 16, 2013), gao.gov/assets/660/651315.pdf [https://perma.cc/6NS2-8MLB].

112. *See* Gross, *supra* note 110.

113. *Id.*

114. *See* Shaun Jacobsen, *The Gas Tax: A Pigovian Tax or Roadway Maintenance Fund?*, TRANSITIZED (June 26, 2013), transitized.com/2013/06/26/the-gas-tax-a-pigovian-tax-or-roadway-maintenance-fund/ [https://perma.cc/FD9G-XJDH].

115. *Id.*

116. *Id.*

dollars than those who drive less, compared to drivers of gas cars who are only taxed relative to the amount of gas used. Additionally, imposing an annual flat fee on EVs to compensate for the gasoline tax may actually discourage EV purchases.[117] A better approach would be to institute a vehicle-miles traveled approach, which would place a value on the number of miles individually driven, and require contribution based on use.[118] This approach would create further indirect effects by incentivizing drivers to drive less, theoretically leading to lower electricity usage, less traffic, and most importantly, decreased wear and tear on the roads.[119]

C. Generation of the Electricity

Many critics complain that EVs still generate greenhouse gases because the electricity they use derives from fossil fuel burning sources, primarily coal and natural gas.[120] Although it is true that this electricity is still generated in large part by the burning of fossil fuels, power plants burn these fuels far more efficiently than do ICEs.[121] The economies of scale achieved by large-scale power plants translate to significantly lower costs of power for EVs as compared to gas-powered vehicles.[122] Additionally, most EVs are charged overnight, which is an off-peak for most utilities, resulting in lower electricity costs.[123]

IV. INDIVIDUAL STATE APPROACHES

State governments are offering additional direct and indirect incentives to EV consumers. As more states consider adding EV incentives, it is important to examine the impact of these state-level policy actions on EV costs and sales. Currently, many states are struggling to

117. Lingzhi Jin et al., *supra* note 63, at 26.
118. Jacobsen, *supra* note 114.
119. *Id.*
120. Pappas, supra note 24, at 163.
121. *See* James Conca, *Are Electric Cars Really That Polluting?*, FORBES, July 21, 2013, forbes.com/sites/jamesconca/2013/07/21/are-electric-cars-really-that-polluting/ [https://perma.cc/ZE4Z-B2BF].
122. Jennifer Todd et al., *Creating The Clean Energy Economy: Analysis of the Electric Vehicle Industry*, INT'L ECON. DEV. COUNCIL (2013), iedconline.org/clientuploads/Downloads/edrp/IEDC_Electric_Vehicle_Industry.pdf [https://perma.cc/YX5Z-N9DX].
123. *See* Carroll Lachnit, *The True Cost of Powering an Electric Car,* EDMUNDS, Nov. 19, 2013, edmunds.com/fuel-economy/the-true-cost-of-powering-an-electric-car.html [https://perma.cc/Z8KN-7FDZ].

balance their budgets.[124] In order to remedy this, they must either increase revenue or reduce expenditures. EV tax credits have the same negative effect as expenditures: they reduce the tax revenue that a state receives, resulting in fewer funds available to pay for essential government services and programs. However, these credits can provide citizens with extra income to contribute to the local economy.[125] Accordingly, it is important to understand both the costs and benefits associated with these credits in identifying an ideal policy.

After the federal tax credit was implemented, many states created their own incentives for those that purchased EVs in their state.[126] As a result, consumers could reduce the cost of buying an eligible hybrid or EV even further. Some states offered incentives in the form of tax credits, while others provided other low or zero-cost alternatives such as access to high-occupancy vehicle (HOV) lanes, reduced registration fees, and assistance with buying a faster charger.[127] Currently, at least thirty-seven states and the District of Columbia offer incentives that make the option of purchasing an EV more appealing.[128]

A. Different Forms of Incentives

Direct incentives are those that have a direct monetary value to consumers, reducing payments EV owners would otherwise have been required to make.[129] These include: purchase subsidies,[130] license tax and fee reductions, Electric Vehicle Supply Equipment financing, free electricity,[131] free parking, and emissions testing exemptions.[132]

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124. *See* Arlena Sawyers, *Lights Out on EV Incentives in Some States*, AUTOMOTIVE NEWS, June 6, 2015, autonews.com/article/20150606/OEM05/306089954/lights-out-on-ev-incentives-in-some-states [https://perma.cc/788Y-EHLG].

125. *See* Linda Sugin, *A Philosophical Objection to the Optimal Tax Model*, 64 TAX L. REV. 229, 229 (2011).

126. *Updated 2017 Incentives for Electric Vehicles and EVSE (Tesla and More)*, PLUGLESS, https://www.pluglesspower.com/learn/updated-2017-incentives-electric-vehicles-evse-state-federal-tax-credits-grants-loans-rebates/#georgia [https://perma.cc/42EQ-QLB3] (last visited April 29, 2017) (providing a summary of states who currently have EV incentives).

127. U.S. Dep't of Energy, *Alternative Fuels Data Center*, http://www.afdc.energy.gov/laws/all?state=CA [https://perma.cc/PM3U-6ZS7] (last visited April 29, 2017).

128. Hartman, *supra* note 39.

129. *See id.*

130. Which are usually offered in the form of tax credits or rebates.

131. When charging at certain public charging stations, EV owners can benefit from free electricity that they otherwise would have paid for at home.

132. Hartman, *supra* note 39.

Indirect incentives are those that do not have a direct monetary value to the consumer.[133] Instead, these incentives save time and provide convenience, which gives value to the consumer.[134] Ten states offer unrestricted access to HOV or carpool lanes for EV drivers.[135] California and Florida also exempt EVs from toll charges on high occupancy toll lanes.[136] States, however, can also create disincentives to EV ownership. For example, in recent years, some states have begun to charge EV drivers an annual fee to make up for lost gasoline tax revenue.[137]

B. State Frameworks

Examination of the particular programs implemented by these states provides a window into the state-level perception of certain issues pertaining to EVs. Although states are free to set their own policies, inconsistent governmental policies around the country have led to customer confusion. While it is important to have a consistent policy of subsidizing EVs across the U.S., the fact that EV tax credits can be of a greater benefit in places where the greatest environmental, health, and energy benefits are attainable must be recognized.[138] Comparing the cost-benefit relationship with the relative effect that each incentive has on EV sales can assist states' decisions regarding where government spending would be most effective in accelerating EV adoption.[139] Accordingly, an in-depth analysis of the economic and financial burdens and benefits of these tax incentives is necessary.

1. California

California is perhaps the most auto-dependent region in the world.[140] California is on the forefront of the EV industry in terms of incentives, production, and new vehicle registrations. California has tossed everything but the kitchen sink at potential electric vehicle consumers, offering a

133. Lingzhi Jin et al., *supra* note 63, at 5.
134. *Id.*
135. *Id.*
136. *Id.*
137. Kevin Schleith, *Implications of Electric Vehicles on Gasoline Tax Revenues* 9, UNIV. OF CENT. FLA.: ELEC. VEHICLE TRANSP. CTR., (Dec 2015), fsec.ucf.edu/en/publications/pdf/FSEC-CR-2011-15.pdf [https://perma.cc/YM3G-GTW6].
138. *See* Virji-Gaidhar, *supra* note 54, at 55.
139. Lingzhi Jin et al., *supra* note 63, at 28.
140. SYDNEY VERGIS ET AL., PLUG-IN ELECTRIC VEHICLES: A CASE STUDY OF SEVEN MARKETS 7 (2014).

$2,000 rebate on top of the federal credit.[141] The state also offers HOV lane access and has experimented with time of day rates for charging, car insurance discounts, and a number of other incentives.[142] These programs have propelled California to the top EV state, accounting for half of the 119,000 new EV registrations nationwide in 2014, and a nation high of 3% of new car registrations in the country.[143]

2. Georgia

The effect of EV tax incentives is perhaps most telling in Georgia, which, after surging to the top of the EV market with considerable EV incentives, may be destined to fall back down after passing legislation to end those incentives. Georgia's incentives for purchasing an EV included a $5,000 tax credit, access to HOV lanes, and favorable electricity rates.[144] These incentives helped make Georgia, and, in particular, metro-Atlanta—which had the highest U.S. market share for PHEV last year—into a national leader in EV ownership.[145] These incentives, however, came to an end when legislators voted that the incentive program would cease to exist beginning on July 1, 2015.[146] In fact, Georgia actually abandoned these incentives for a disincentive, imposing a $200 registration fee on new EV purchasers, the highest in the country.[147] Legislators supported this policy shift by noting that the state was dedicating considerable funding to these tax incentives at a time when the state was struggling to manage its budget.[148] Georgia's state department argues that cutting the credits and adding the registration charge will generate a combined $68 million in new revenue for the 2016 fiscal year.[149]

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141. CAL. CLEAN VEHICLE REBATE PROJECT, *Eligibility Guidelines*, cleanvehiclerebate.org/eng/eligibility-guidelines [https://perma.cc/87WX-6PVD] (last visited Apr. 5, 2017).

142. CAL. ENERGY COMM'N, *Assembly Bill No. 109: Alternative and Renewable Fuel Vehicles Technology Program*, energy.ca.gov/altfuels/documents/ab_109_bill_20080926_chaptered.pdf [https://perma.cc/6JLR-6BXV] (last visited Apr. 9, 2017).

143. Jan Ellen Spiegel, *State To Make A Start On Electric Vehicle Incentives*, HARTFORD COURANT, May 18, 2015, http://www.courant.com/politics/hc-ctm-ev-incentives-0519-20150518-story.html [https://perma.cc/H8SY-VM6G].

144. *Id.*

145. Andria Simmons, *Georgia Slams Brakes on Electric Cars*, ATL. J. CONST., Apr. 13, 2015, ajc.com/news/state--regional-govt--politics/georgia-slams-brakes-electric-cars/VHaN8JignbcfgDntTgmrtJ/ [https://perma.cc/G53Z-AM5W] [hereinafter *Georgia Slams Brakes on Electric Cars*].

146. *Id.*

147. Andria Simmons, *Electric Cars May Lose Tax Credits,* ATL. J. CONST., Mar. 5, 2015, at 1A [hereinafter *Electric Cars May Lose Tax Credits*].

148. *Georgia Slams Brakes on Electric Cars*, *supra* note 145.

149. *Electric Cars May Lose Tax Credits*, *supra* note 147.

Supporters of the tax credit contend that, although ending the EV incentive policy would increase tax revenue, reducing economic production and growth in Georgia will cause the loss of an even greater monetary amount.[150] One economic study showed that Georgia car owners would pay $155 million more at the gas pump in the next five years, while saving only $60 million in electricity.[151] Therefore, Georgia's consumers would take a hit by losing fuel savings, and would simultaneously increase spending on fuel—a market whose profits leave the state. While critics of the tax credit emphasize its burden on the state budget, proponents argue that the benefits of reduced gasoline consumption have created positive ripple effects throughout Georgia's economy.[152] These benefits represent extra income that could have been used on other goods or services throughout the state. A reduction in the number of EV purchases will also result in a decrease of the federal funds flowing into the state by way of the federal tax credit.[153] Although the elimination of the tax credit might be beneficial for Georgia in the short run, it is possible it will be hurting itself in the long run.

3. Other States

There are a number of other states that offer enticing tax incentives.[154] "Colorado is currently the nationwide leader in EV tax credits, offering up to $6,000 in [EV] tax credits for drivers who register new EVs in the state."[155] Louisiana, Massachusetts, Washington, California, and New Jersey are also leading states when it comes to offering tax incentives for EV purchasers.[156] On the other hand, Mississippi, Oklahoma, North Dakota, and Wyoming—states that offer almost no benefits to EV owners—have nearly no EV sales.[157]

C. Correlation to Sales

A statistical analysis performed by The International Council on Clean Transportation revealed that there is a significant positive correlation

150. *Id.*
151. *Id.*
152. *Id.*
153. *Id.*
154. Doug DeMuro, *EVs and Plug-In Hybrids: 7 States with Compelling Tax Incentives*, AUTOTRADER (Apr. 2015) autotrader.com/best-cars/evs-and-plug-in-hybrids-7-states-with-compelling-tax-incentives-238806 [https://perma.cc/FT39-ZV9X].
155. *Id.*
156. *Id.*
157. Lingzhi Jin et al., *supra* note 63, at 26.

between the total monetary benefit to consumers from state incentives and BEV sales across all fifty states.[158] This suggests that further attempts to increase state-driven incentives to grow EV sales will substantially drive down the total cost of owning and operating an EV, leading to a spike in total sales.[159] Some types of incentives appear to be more effective in driving sales than others. A stepwise regression analysis uncovers that of all the different types of incentives, subsidies contribute the most to BEV sales share, followed by HOV lane access, emissions testing exemptions, and annual fees,[160] which have a negative impact on BEV sales.[161] While the $7,500 federal tax credit is a major factor in encouraging potential EV buyers to purchase, research shows that, in states offering the most comprehensive incentive packages, the total monetary value of those packages can nearly approach the impact of the federal credit on encouraging EV purchases.[162] These results suggest that state EV incentives are playing a significant, early role in reducing the effective cost of ownership and driving electric vehicle sales.

D. Different Benefits to Different Areas

Economists criticize the current national policy of subsidizing EVs by burdening all U.S. taxpayers, and alternatively recommend the achievement of greater social benefits by targeting the EV tax credit to taxpayers in locations where the tax credit provides the greatest environmental, health, and energy social benefits.[163] The determination of whether EVs are an improvement over conventional cars depends on that state in which the driver lives and that state's reliance on fossil fuels, such as coal and natural gas to generate electricity. West Virginia, for example, the second largest coal producing state,[164] offers some of the best incentives for EV purchases, as more EVs on the road means more coal production, which inevitably helps the state. [165]

158. *Id.* at ii.
159. *Id.* at iii.
160. *Id.* at 26.
161. *Id.*
162. *Id.*
163. Virji-Gaidhar, *supra* note 54, at 55.
164. NAT'L MINING ASS'N, *Statistics: Coal Production by State & by Rank* (Nov. 17, 2016), nma.org/2016/11/17/coal-production-by-state-and-by-rank/.
165. *See* Div. of Motor Vehicles, *Green Driver State Incentives in West Virginia*, dmv.org/wv-west-virginia/green-driver-state-incentives.php [https://perma.cc/8WVH-X5HM] (last visited Apr. 9, 2017).

V. PROPOSALS

There are policy proposals that can accomplish the objective of making EVs more accessible to buyers. By increasing the amount of EV sales and focusing on tax-based incentives, consumers will contribute to the achievement of the large-scale goals of decreasing greenhouse gas emissions and increasing energy security by reducing foreign oil consumption. It appears that overall EV use is steadily growing, and a fully EV fleet could one day be a possibility. Although attainment of this goal may be many years away, certain policy shifts should be implemented to stimulate this transition.

A. Encouraging Research and Development Into Battery Technology

Policies should be implemented to spur development of EVs with longer ranges and with technology capable of reducing the charge time of vehicles. Two of potential EV consumers' biggest concerns are the charge time of their vehicles and range anxiety.[166] Current federal tax incentives are based upon the size of the battery in the vehicle.[167] As almost all EVs receive the $7,500 credit now, the requirements to gain the full credit should be updated to reflect current battery technology. By making the full tax credit attainable only if the battery has a range of 150+ miles,[168] such a policy will encourage EV manufacturers to improve technology so as to allow the most appealing tax credit possible.

B. Make the Tax Credits More Consumer Friendly

Increasing the federal tax credit and incentives received by purchasers, but excluding the increase from sales of vehicles costing over $50,000, will help assist in providing incentives to those consumers who need them the most. If the goal of the credits is to save consumers money, people with lower earnings should benefit most from the credit. Likewise, if PHEV cars are intended to produce savings on operational costs, lower income consumers are the ones who most need the tax breaks. Although EV development is increasing, it is not doing so quickly enough. Research has

166. *See* PLUG IN AMERICA, *Addressing Factors that Cause Range Anxiety* (2013), pluginamerica.org/addressing-factors-cause-range-anxiety-0/ [https://perma.cc/3EMN-6QQQ].

167. INTERNAL REVENUE SERV., *Plug-In Electric Drive Vehicle Credit (IRC 30D)* (Feb. 8, 2017), irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d [https://perma.cc/DJD5-AWYR].

168. A goal that is proven to be ascertainable by the Tesla Model S, whose best battery can go 285 miles on a single charge.

shown that as tax incentives increase, so do the number of EVs purchased.[169] Research has also revealed that it is beneficial to the economy of the state to have tax incentives in place, as this leads to growth in its gross domestic product.[170] Therefore, both federal and state lawmakers should implement tax policies that reward consumers who make the decision to purchase an EV.

C. Strengthen Renewable Energy Policies

With the right policies in place, goals to increase renewable generation of electricity and further strengthen the environmental benefits of electric vehicles can be achieved. The U.S. has never been shy in investing in research and development for energy related projects. In 2007, the federal government created an energy research and development department called the Advanced Research Projects Agency, which, in part, undertakes research and development for EV technology.[171] The return on investment of these projects could be well worth it. For example, with increased EV use and a reduced dependence on foreign oil, the U.S. could begin to cut the billions of dollars it spends in defense to protect the nation's oil interests abroad.[172] Benefits would be seen down the line, as decreasing defense spending would reduce the federal deficit and, thus, decrease the amount of taxes Americans would have to pay.[173] This is just one of the numerous benefits that increased EV use has to offer. Overall, a continued investment in research and development of EVs will continue to produce technologies that clean the air, protect energy security interests, and preserve America's technological lead.

CONCLUSION

Although the EV industry is in infancy, the potential benefits are already being recognized, as sales are steadily increasing and lawmakers are taking action to push these gains even further. The potential short- and long-term benefits for both individual consumers and society at large make investing in this industry worthwhile as a step toward a renewable, sustainable energy future. A combination of the federal tax credit with

169. *See, e.g.*, FEDERAL TAX CREDITS, *supra* note 79, at 15.
170. Gross domestic product is the monetary value of all the finished goods and services produced within a country's borders in a specific time period.
171. *BEEST: Batteries for Electrical Energy Storage in Transportation*, ARPA-E (Apr. 29, 2010), arpa-e.energy.gov/?q=arpa-e-programs/beest [https://perma.cc/QK9D-JRLU].
172. Pappas, supra note 24, at 191.
173. *Id.*

states' implementation of their own incentives will go a long way toward making these goals increasingly attainable. With continued support from the federal government, states should be encouraged to look at their individual needs and resources, and should implement incentives as they see fit. Yet, a watchful eye must be kept on the ever-changing technology of this industry, and policy must be updated when necessary. If this is done, the goals of these policies will be obtained. Once these goals are accomplished, an increased demand in EV ownership will lead to a reduction in dependence on foreign oil, increased competition globally for private investment, jobs, exports, and diminished energy needs.

Andrew Rabalais[*]

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* J.D./D.C.L., 2017, Paul M. Hebert Law Center, Louisiana State University.

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