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THE NEED TO ENACT FEDERAL, ENVIRONMENTAL-FRIENDLY
INCENTIVES TO FACILITATE INFRASTRUCTURE GROWTH OF
ELECTRIC AUTOMOBILES

by

VAMSIKRISHNA KARANAM

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Legal Studies
in the College of Community Innovation and Education
and in The Burnett Honors College
at the University of Central Florida
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Thesis Chair: Dr. Karen Consalo

ABSTRACT

As newer technological advancements are developed and introduced, a question regarding their adoption into society has become known. If such advancements in technology mutually benefit the people using them as well as the environment we live in, should there not be provisions in place to incentivize the creation and purchase of these technological advancements.

Electric vehicles are an advancement of technology that is currently available for widespread adoption in the transportation sector of our country. However, questions as to why EVs should be adopted will be asked by critics. That is the question this thesis attempts to answer. Our global environment, specifically in our country is constantly dealing with environmental damage that pollutes our atmosphere and exposes us to natural disasters that lead to loss of life. The pollution that arising from the tailpipes of a vehicle that runs on fuel that is non-renewable is one of the largest contributors to this travesty. Electric vehicles attempt to dissolve this issue while still keeping modes of transportation as is. When such attributes are available to use, when and how we use them depends upon the law.

This thesis determines the drawbacks of traditional, fuel-burning vehicles, suggests how electric vehicles can make the environment a safer place, and most importantly, whether there are any incentives on the state level promoting the use of electric vehicles, as well as an in-depth study of any such incentives at the federal level and why there needs to be more. By comparing electric vehicles with traditional vehicles, as well as the infrastructure that is required to both fuel and build these vehicles, this thesis will clearly outline the benefits of electric vehicles and why it is dangerous to continue the use of fuel-burning vehicles. Thereafter this work will compare

incentives from numerous states that are already in place and compare the progress on the state level to the federal level and why it is important that more federal incentives come into play.

DEDICATION

This work is dedicated to my family, for the everlasting love and support,
To my teachers and professors, for the boundless knowledge,
To the University of Central Florida, for the timeless experience,
And to my lord and savior, Shiva, for without whom I am a soulless being.

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INTRODUCTION

One of the largest ever-growing facets of our world today, is that of the pioneering sector of electric transportation. Decades ago, the mere idea of electric transportation would have made a person look cynical. Yet here we are twenty-two years into the twenty-first century and, not only is electric transportation beginning to change our lives, but it has also risen to be a valuable part of the answer to a sustainable world and a safer future. Earth's existence is not eternal, that is common knowledge by now. This thesis primarily revolves around the possibility that humankind may cease to exist well before the Earth does. This work specifically studies the state of our planet's environment, the biggest factors that have led and are leading to the decimation of Earth's immune system, and how specifically these facets of human life are doing such damage. This study primarily focuses on the damage conventional and traditional transportation, which refers to vehicles that rely on natural gas, have on increasing global warming, which in return harms the environment further. Subsequently, this work will discuss the different negative impacts that traditional vehicles have on the United States of America, such as harming human health and impairing the economy. Furthermore, by analyzing alternatives to traditional transportation, and their rise in recent years, as well as the factors that make these trailblazing modes of transportation different and environmentally friendly, they will be compared to traditional vehicles. This comparison will provide a tangent for this study to discuss the variety of electric transportation that are available to the world. Then this thesis will study the type of infrastructure that is needed to support a countrywide shift to electric transportation and whether there are any federal incentives to help speed this movement or how state incentives could be used to influence similar federal incentives. Thereafter, this writing will judge the impact the law

has on electric transportation at this present time and expectations and predictions regarding the federal law's role in this field will be made through critical comparisons and analysis.

In totality, this work will be divided into four parts, the first will discuss the detrimental state and continued depreciation of our environment's health in general and what fraction of it is a contribution from the usage of traditional vehicles. The second part will use the method of comparative analysis to dissect the differences between Zero-Emission Vehicles and traditional vehicles, as well as the distinct types of electric transportation. Then, the third part will dive deep into understanding the laws that are at play at both the federal and state level, including federal and state incentives, and the need for more effective federal incentives for infrastructure such that there is change in thinking in society allowing the public to comfortably switch to electric modes of transportation. Finally, the last part will cover predictions for the future of the transportation sector and also emphasize the main point that this thesis is trying to make. This work will attempt to provide a reason to want newer federal incentives, by discussing the shortcomings of traditional vehicles and the areas in which electric vehicles (EVs) will outleap their faults, this thesis will emphasize the benefits of switching to electric vehicles. Thereby alluding the need for more activity at the federal level of our government to create newer and more effective federal incentives that will assist manufacturers in building electric vehicle infrastructure and buyers in purchasing and using electric vehicles.

Throughout this work, intellectual resources will be used in the comparative analysis between traditional vehicles and electric vehicles. The purpose of this writing is to clearly signify the need for a change in our mode of transportation and how federal action can help bring this

change about. Following this analysis, this work will provide a conclusion and predictions for the future regarding the impact electric vehicles can have on our environment.

THE NEED FOR ELECTRIC TRANSPORTATION

Global Devastation in General

If we were to discuss the environmental changes that have happened since the beginning of the Industrial Revolution, and dissected every change that has occurred since then, most of us would not acknowledge that our environment's constant change is not good whatsoever. This very change, commonly known as climate change has brought upon countless natural disasters to the communities of our world.¹ Our environment first started changing since the Industrial Revolution, nearly two centuries ago. Mankind's everyday activities such as fossil fuel burning have brought natural disasters upon us.² Science also shows that human activities have led to our planet getting significantly warmer, in fact, data has shown that since 2001, we have lived through eighteen of our nineteen hottest years.³ This phenomenon of increasing the Earth's average temperature is also more commonly known as Global Warming. Global Warming leads to climate change which leads to natural disasters and significant loss both to humankind and our economy. To provide an example, the arrival of seventeen officially named storms in the year of 2017, destroyed the area separating the United States and the Caribbean to such a degree that the overall damage resulted in \$370 billion dollars of damages..⁴ That is only the damages caused in the area between the Caribbean and the United States. Across the globe, there is much more

¹Michael Burger, Jessica Wentz & Radley Horton, *The Law and Science of Climate Change*

Attribution, 45 COLUM. J. ENVTL. L. 57 (2020).

² *See id.*

³ *See id.*

⁴ *See id.*

added devastation and loss. In the same year, 2017, the Southeastern region of Asia experienced a monsoon season like never before, totaling in over 1,200 lives lost and 45 million people affected, spread across the countries of Nepal, Bangladesh, and India.⁵

Other disasters, such as a record number of wildfires in the United States and British Columbia have taken hundreds of lives and destroyed millions of acres of land.⁶ Heat waves to the extent that science has never seen before has led to severe rainfall and flooding in the Middle East and Central and Southern America.⁷ All of the foregoing have happened only in the years 2017-2018.⁸ This spike in devastation and loss of life, have led the suffering public to file lawsuits against those responsible, primarily the governments and fossil fuel companies.⁹

A question regarding the role global warming plays in stirring up natural disasters is not common knowledge to everyone. Global warming is simply the heating of the earth that results in climate change, hotter climates, the rising of sea levels, the melting of glaciers, and could potentially result in islets or small islands across the surface of the earth to sink.¹⁰ Global

⁵ *See id.*

⁶ *See id.*

⁷ *See id.*

⁸ *See id.*

⁹ *See id.*

¹⁰ Iin Karita Sakharina, Farida Patittingi, Hamzah Halim, Marthen Napang, Juajir Sumardi , Andi

Bau' Inggit & Marcel Hendrapati, *REGIONAL FOCUS & CONTROVERSIE: Sinking or*

warming generally refers to the observed warming of the planet due to the release of human-caused greenhouse gas emissions.¹¹ Although global warming and climate change are used interchangeably, global warming is just one aspect of climate change, because global warming helps speed up climate change which results in hotter temperatures, leading to disasters such as glaciers or ice sheets melting, higher water levels, and ocean acidification.¹² Global warming could also be denoted as man-made climate change and has the potential to result in extreme weather events such as earthquakes and tsunamis.¹³ It is also vital to note that the hotter our earth has gotten, or the more the global warming, the more the natural disasters.¹⁴

In order to complete our everyday tasks, burning fossil fuels is essential, yet harmful for the environment, because the emissions that come about when burning fossil fuels are also known as greenhouse gas emissions and lead to global warming. Mankind's activities, such as industrial production and land use change along with fossil fuel combustion, impacts the immunity of our environment by releasing gases that destroy the environment.¹⁵ An example of this would be carbon dioxide, which is a greenhouse gas. Carbon dioxide emissions have

Not? An Indonesian Approach to Prevent the Rise of Sea Levels due to Global Warming, 13 JEAIL 143, (2020).

¹¹ *See id.*

¹² *See id.*

¹³ Jessica Lucia Frattaroli, *NOTE: A State's Duty to Prepare, Warn, and Mitigate Natural Disaster Damages*, 37 B.C. INT'L & COMP. L. REV. 173 (2014).

¹⁴ *See id.*

¹⁵ Burger, *supra* note 1.

increased more than 40% since the onset of the Industrial Revolution¹⁶. Such levels have not been seen since more than three million years ago.¹⁷ These changes have led to widespread global warming and as this has occurred, the Arctic sea ice volume in the summer has decreased by more than 50% which has been accompanied by a sea level rise of nearly eight inches.¹⁸ The frequency and intensity of extreme weather events has varied dramatically due to global warming.¹⁹ Water levels at beaches and coastlines, along with disasters such as droughts and floods, have experienced a drastic increase as the years pass by.²⁰

Traditional Vehicular Impact on the Environment

When discussing environmental damage and the root cause of a majority of it, it is vital to look at various facets of our society to deduce where exactly this onslaught of toxicity arrives from. Not a day goes by where humans do not introduce harmful substances into the atmosphere that harm the environment without properly understanding the consequences and the damage it causes.²¹ At first, the scientific community as well as the regular public did not even know that vehicular exhaust could lead to environmental damage. However, after the first air regulations

¹⁶ *See id.*

¹⁷ *See id.*

¹⁸ *See id.*

¹⁹ *See id.*

²⁰ *See id.*

²¹ Michelle Castaline, *Disincentivizing Driving and Encouraging the Use of Public*

Transportation to Combat Vehicle Pollution at a State Level, 25 HASTINGS W.-N.W.J.

ENV. L. & POL'Y 205 (2019).

were passed that all changed. Scientific evidence started to indicate that vehicular emissions diminish the quality of the air we breathe in the form of ozone at the ground level.²² In addition, the science also shows that vehicular emissions emit large quantities of carbon dioxide, which is the largest contributor to global warming, essentially playing a mammoth role in climate change and environmental degradation overall.²³ Once technology and science had made a significant leap, it became known that the gases emitted from operating a vehicle, led to smog and health implications to everyone on the road.²⁴ In the year of 1952, in London, the city experienced a stretch of five days in which smog completely covered the streets and restrained visibility to merely a few feet, coining the title “Great Smog of 1952.”²⁵ The smog and pollution during this time was so dangerous that till today it is known as one of the worst crisis’ in European history, leaving between eight to twelve thousand people dead.²⁶ A scenario similar to this occurred in the United States. In the 1940’s smog arising from vehicles blanketed the city of Pennsylvania leaving countless ill and twenty dead.²⁷

Not only does this pollution impair visibility and produce smog, but as noted above, it leads to illness and in unfortunate circumstances, death. Although air pollution does not solely arise from tailpipe emissions from vehicles, traditional fuel-burning vehicles do contribute to air

²² *See id.*

²³ *See id.*

²⁴ *See id.*

²⁵ *See id.*

²⁶ *See id.*

²⁷ *See id.*

pollution. Greenhouse gases emitted from the tailpipe of an internal combustion vehicle do play a part in bringing about these dangers to our environment. Our country slightly took a turn for the better in 2010 when the Clean Air regulations helped save over a hundred thousand lives.²⁸ Recent studies also indicate that vehicles that emit exhaust from the use of ICEs (Internal Combustion Engines), which are essential to operate a traditional vehicle, via the tailpipes, are the main sources of air pollution in the United States that do not meet National Ambient Air Quality Standards (NAAQS).²⁹ Although carbon dioxide is the largest contributor to global warming, other gases such as carbon monoxide, nitrogen oxides, hydrocarbons, and ozone pollutants, are also emitted and negatively impact the environment.³⁰

A look at the Clean Air Act and its regulations, provides an understanding of how largely U.S. lawmakers value air pollution and how it exacerbates global warming. Title 42 of the United States Code, under § 7401 states that, “The Congress finds...the growth in the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles, has resulted in mounting dangers to the public health and welfare, including injury to agricultural crops and livestock, damage to and the deterioration of property, and hazards to air and ground transportation.”³¹ The Clean Air Act also states that standards can be applied in accordance with the provisions regarding the emission of any air

²⁸ *See id.*

²⁹ *See id.*

³⁰ *See id.*

³¹ 42 U.S.C. § 7401 (2022).

pollutant from any new motor vehicle or engine which may contribute to air pollution and could possibly endanger public health or wildlife.³²

A major reason for why the transportation sector is such a large part of global environmental damage, is because of the use of passenger vehicles and heavy duty trucks.³³ In fact, these foregoing types of vehicles are responsible for more than half the carbon monoxide and nitrogen oxides released by vehicles in general and nearly a quarter of the hydrocarbons released by vehicles.³⁴ Despite this, nearly 17.5 million Light-duty vehicles (LDVs), most commonly known as passenger vehicles, were bought in 2016.³⁵

Although deadly incidents such as the “Great Smog of 1952”, are not common today, it is worth noting that fuel-burning vehicles still harm the environment. For the first time since carbon emissions were tracked in the 1970s, the transportation sector is the leading sector in terms of emission contribution for carbon emissions.³⁶ Although the power sector of our economy leads in terms of the total energy consumed, the transportation sector leads every other sector in greenhouse gas emissions.³⁷ A major contributor to this are LDVs, which are dominated by internal combustion engines that emit approximately twenty pounds of carbon dioxide for

³² 42 U.S.C. § 7521 (2022).

³³ Castaline, *supra* note 21.

³⁴ *See id.*

³⁵ *See id.*

³⁶ Amy L. Stein & Joshua Fershée, *Decarbonizing Light-Duty Vehicles*, 48 ELR 10596 (2018).

³⁷ *See id.*

every gallon of gas burnt.³⁸ The troublesome numbers associated with the release in carbon dioxide as well as other gases when driving a traditional vehicle, are part of the reason why infrastructure needs to be built at a larger pace to accommodate a much needed transformation to alternative vehicles, which do not rely on the burning of fossil fuels.³⁹

A continued use of traditional, fuel-burning vehicles leads to detrimental impact on human health, global economy, and paves way for natural disasters as well as the continued deterioration of our environment. Although the transportation sector itself is not the only root cause of a global phenomenon such as global warming or climate change, it has risen to a status where it is the largest. Without informing the public and establishing federal incentives to facilitate the growth of electric vehicle infrastructure, we risk our future generations to even worse conditions. Floods, droughts, heat waves, wildfires, smog, pollution, land loss, and heavy rainfall are few of many other side effects that continued pollution will have on the environment and in turn our daily lives.

³⁸ *See id.*

³⁹ *See id.*

A COMPARISON BETWEEN TRADITIONAL AND ELECTRIC VEHICLES

Vehicular Comparison

To understand the true definition of Electric Vehicles, we should first understand that they are a sub-category within the entire group of vehicles that is Zero Emission Vehicles (ZEVs). Electric vehicles are a type of Zero Emission Vehicles which are not powered or operated by traditional fuel but rather with batteries.⁴⁰ The batteries that are used to operate electric vehicles are rechargeable and reusable and merely because of that fact, there will be a reduction of any further negative environmental impacts and negative impacts on the world's diminishing oil supply.⁴¹ The biggest and most obvious reason for this reduction of negative environmental impact, is because zero emission vehicles do not produce any pollution while operating.⁴² A couple of years ago when electric vehicles first started garnering the public's attention, many critics reasoned that the lead emissions produced by power plants that charge these vehicles, would simply replace the internal combustion engine of a vehicle, and on the whole not provide much of a benefit to the air quality.⁴³ Although the foregoing argument has

⁴⁰ Bobbie Anne Flower, *NOTE AND COMMENT: Electric Vehicles: A Breath of Fresh Air for the Next Millenium*, 15 PACE ENVTL. L. REV. 329 (1997).

⁴¹ *See id.*

⁴² *See id.*

⁴³ *See id.*

been proven to be without merit, the only opposition for electric vehicles at this moment is not if, but when and how electric vehicles should be integrated into our society.⁴⁴

Electric vehicles can be categorized primarily into two different types of vehicles: hybrids (HEVs) and fully electric vehicles (BEVs).⁴⁵ Hybrids are generally a combination of a traditional internal combustion engine and either a battery or an electric motor to operate the vehicle.⁴⁶ Fully electric vehicles on the other hand, operate solely on an electric motor and are also known as battery electric vehicles.⁴⁷ A sub-category of hybrids are called plug-in hybrid electric vehicles (PHEVs).⁴⁸ Battery electric vehicles, since they rely solely on an electric motor, requires a larger battery that stores more energy than the two other types of electric vehicles and like plug-in hybrid electric vehicles, the fully electric vehicle recharges when plugged into a power source.⁴⁹ Hybrids are not completely electric, however do benefit the environment because they are not completely denoted as fuel-burning vehicles. BEVs on the other

Although electric vehicles look and seem quite similar to traditional vehicles, they are built with different components on the inside.⁵⁰ There are three main components that are used to

⁴⁴ *See id.*

⁴⁵ Stein & Fershée, *supra* note 36.

⁴⁶ *See id.*

⁴⁷ *See id.*

⁴⁸ *See id.*

⁴⁹ *See id.*

⁵⁰ John C.K. Pappas, *A New Prescription for Electric Cars*, 35 ENERGY L. J. 151 (2014).

run an electric vehicle smoothly: the batteries, controller, and electric motor.⁵¹ The batteries store electricity which is similar to a traditional vehicle's gas tank, the controller regulates how much of the batteries' stored electricity is sent to the electric motor, and the electric motor powers the car.⁵²

Similar to how there are different electric vehicles, there are also different kinds of batteries that fuel these electric vehicles.⁵³ Specifically, there are three; lead-acid, nickel-metal hydride, and lithium-ion batteries.⁵⁴ Out of the previously stated types of batteries, the lithium-ion batteries have developed and progressed to being the most famous.⁵⁵ The reason for the lithium-ion batteries' fame is because of their best performance and range and because of human familiarity with them due to their application in laptops and cell phones, regardless of their high cost.⁵⁶ There are different forms of electric vehicles; the hybrid, the plug-in hybrid, and the fully electric vehicle also known as the battery electric vehicle. Another, less famous form of electric vehicle is called the fuel-cell electric vehicle (FCEV). The fuel-cell electric vehicle combines hydrogen fuel and oxygen to produce electricity and power to run an electric vehicle.⁵⁷ Although

⁵¹ *See id.*

⁵² *See id.*

⁵³ *See id.*

⁵⁴ *See id.*

⁵⁵ *See id.*

⁵⁶ *See id.*

⁵⁷ *See id.*

a couple car manufacturers have developed fuel-cell electric vehicles, they are only available for lease and even then to only a small group of people.⁵⁸

Traditional vehicles, which could also be known as Internal Combustion Vehicles (ICVs), are the most responsible for photochemical smog, the most important source of urban air pollution.⁵⁹ This pollution is so harmful that the Environmental Protection Agency (EPA) stated that nearly 15,000 people die per year because of exposure to ozone-induced smog, ozone being one of the pollutants that a traditional vehicle releases a significant quantity of.⁶⁰ The grave dangers ICVs bring is more commonly accepted around the world today because factual evidence proving the damage vehicular exhaust has on the health of our environment.

The mere dangers themselves should be a significant warning enough to urge the public to switch from fuel burning vehicles to electric vehicles. The only opposition to the electric vehicle is the notion that the emissions produced by power plants that charge an electric vehicle's batteries, does not benefit air quality. However, science has shown that even when factoring these emissions, electric vehicles are still less pollution to the environment than their fuel burning counterparts.⁶¹ In addition, but of lesser importance, electric vehicles reduce noise pollution and promote energy efficiency by operating smoothly and quietly.⁶² Electric vehicles

⁵⁸ *See id.*

⁵⁹ *See id.*

⁶⁰ *See id.*

⁶¹ *See id.*

⁶² *See id.*

are over 90% less polluting to the environment than even the best, lowest emission producing vehicles. To take a step further, internal combustion vehicles contain emission control systems that deteriorate the more they are used, resulting in the vehicle to eventually produce emissions that exceed the limits established, a worry that one does not need to think about when using an electric vehicle.⁶³

Regardless of how beneficial electric vehicles are to the country and to the world, there will always be critics and a faction of science that disputes and believes that electric vehicles have no overall benefit to reducing environmental damage because of the lead emissions from power plants to produce energy for the vehicle to operate. Admittedly the lead emissions are a concern but because these emissions are centralized, it is more easily and efficiently regulated than the mobile emission from traditional vehicles.⁶⁴ There were many studies conducted that alleged that lead from the power plants and from the disposal of the lead-acid battery would offset the fact that EVs produce zero tailpipe emissions, essentially providing zero upside to EVs.⁶⁵ However, medical studies have proved that lead-related health problems arise from deteriorated paint, older buildings and urban soil, and emissions of leaded gasoline, sources that are not related to the manufacturing of the lead-acid batteries or their facilities.⁶⁶ Another reason to not fear for these lead emissions is because lead is recyclable and only dangerous when

⁶³ *See id.*

⁶⁴ Flower, *supra* note 40.

⁶⁵ *See id.*

⁶⁶ *See id.*

combusted in open air, which is not the case when producing energy to run an electric vehicle.⁶⁷ Finally, lead emissions at the facilities that lead-acid batteries are made are a smaller source of threat than emissions from internal-combustion engines, because of the localization of the factories that build lead-acid batteries.⁶⁸

When in complete operation of both an electric vehicle and an internal combustion vehicle, the electric vehicle will have zero combustion which is clearly not the case for an internal combustion vehicle.⁶⁹ Unlike traditional vehicles, electric vehicles do not need to store liquids such as oils, antifreeze, and lubricants, which are important to keep a the numerous parts of an internal combustion engine running safely, but most of which are highly flammable and immensely toxic when improperly introduce to the environment.⁷⁰ During the process of operating an electric vehicle, there is no combustion due to the lack of fuel burning, thereby not producing heat as well while the vehicle is running, which is not the case with fuel-burning transportation.⁷¹ The heat which is produced by a vehicle operating on an internal combustion engine through its tailpipe, adds to the greenhouse effect and global warming.⁷²

⁶⁷ *See id.*

⁶⁸ *See id.*

⁶⁹ *See id.*

⁷⁰ *See id.*

⁷¹ *See id.*

⁷² *See id.*

The main intention of electric vehicles is to reduce the world's dependence on oil and nonrenewable resources.⁷³ To enhance the importance of diminishing oil dependence further, studies have shown that plug-in hybrid vehicles (PHEVs) consume approximately 67% less oil than internal combustion vehicles and about 45% less oil than hybrid vehicles.⁷⁴ Battery electric vehicles are naturally the only type of vehicle that does not consume any oil whatsoever.⁷⁵ This fact alone signifies how much the adoption of plug-in hybrid and battery electric vehicles could have on the United States by reducing the country's dependence on oil and enhance the overall country's energy security.⁷⁶ Hybrid vehicles on the other hand consume 36% less oil than fuel-burning vehicles.⁷⁷

Electric vehicles benefit our country and assist the world into becoming a healthier environment to live in. Vehicles that continue to rely on internal combustion engines put the health of our citizens, our cities, our country, and in totality, our world in grave danger. From the engine to the build there are multiple reasons as to why electric cars such as hybrids, plug-in hybrids, fully electric, and even fuel-cell powered vehicles are beneficial to humankind. By reducing our dependence on oil and the burning of fossil fuels which leads to the emission of toxic elements into our atmosphere, we save lives, vegetation, and start a healthier trend.

⁷³ Pappas, *supra* note 50.

⁷⁴ *See id.*

⁷⁵ *See id.*

⁷⁶ *See id.*

⁷⁷ *See id.*

Infrastructure Comparison

Not only are electric vehicles made differently from traditional vehicles, the support system such as the factories they are built in, charging stations, the type of refueling, and the maintenance of these electric vehicles are also drastically different. Take fuel-cell electric vehicles for example, the hydrogen that is used to power these vehicles needs to be kept in a liquefied state at 420 degrees below zero, which is immensely expensive and difficult, thereby requiring expensive infrastructure to be created to distribute this liquefied hydrogen for refueling.⁷⁸ It is because of these major reasons that fuel-cell electric vehicles are very few in numbers. Likewise, charging stations for battery electric vehicles and plug-in hybrids are also extremely hard to establish. In fact a lack of charging stations from street to street in the manner that we have gas stations is one of the major issues that provides a roadblock to widespread adaptation to these new vehicles, especially in highly populated states like California.⁷⁹ Arguably the only type of electric vehicle that does not need any new infrastructure is the hybrid electric vehicle.⁸⁰ Plug-in hybrid and battery electric vehicles require longer charge times, battery replacement, and necessary charging station infrastructure.⁸¹ Hence, in order to fully electrify

⁷⁸ *See id.*

⁷⁹ Joel M. Smith, *REVIEW OF SELECTED 2011 CALIFORNIA LEGISLATION: ARTICLE: Civil: Chapter 121: Charging Stations in Common Areas - Laying the Groundwork for California's Electric Car Infrastructure*, 43 MCGEORGE L. REV. 572 (2012).

⁸⁰ Pappas, *supra* note 50.

⁸¹ *See id.*

vehicular transportation, the infrastructure in place for electric vehicles needs to take a leap forward.

In the United States privately owned gasoline service stations have, developed over the years, to provide the public an easy access to fuel vehicles that operate with an internal combustion engine.⁸² The petroleum and gasoline which are required to fuel a fuel burning vehicle, are transported from different parts of the world, via numerous complex land and sea networks, which is not the case for electric vehicle charging infrastructure.⁸³ The model of infrastructure that is needed to fuel electric vehicles is already partially in place, and that is no other than the electricity grid within our country.⁸⁴ This electricity grid is a combination of power plants and transmission and distribution wires which are owned by a varying number of both public and private entities.⁸⁵ Although a certain base or foundation, is already in place to expand the charging infrastructure for electric vehicles, additional infrastructure investments and advancements could be necessary or very essential in assisting the widespread adoption of electric vehicles.⁸⁶ An example of these investments and advancements could be inclusive of private high-speed charging outlets in homes, public charging outlets, upgrades to the electricity

⁸² Brandon Hofmeister, *Electric Vehicle Charging Infrastructure: Navigating Choices Regarding Regulation, Subsidy, and Competition in a Complex Regulatory Environment*, 5 GEO.

WASH. J. ENERGY & ENVTL. L. 42 (2014).

⁸³ *See id.*

⁸⁴ *See id.*

⁸⁵ *See id.*

⁸⁶ *See id.*

distribution system in the United States, advanced electricity metering technologies, and maybe even additional electricity generation infrastructure.⁸⁷

With respect to charging infrastructure, some scientists and analysts believe that public charging stations are obligatory when discussing infrastructure necessities to promote widespread adoption of electric vehicles.⁸⁸ The primary reason for this is to dissolve an anxiety that many electric vehicle drivers also denoted as “range anxiety.”⁸⁹ “Range anxiety” is the fear that the electric vehicle might run out of charge while driving and there will not be a charging station close by.⁹⁰ Although many people dispute that charging stations are a requisite for electrical vehicle usage, it is indisputable that the prospective of having supplemental charging stations would ease the public’s anxiety and make electrical vehicle use simultaneously more economic and convenient thereby making widespread use of this advanced vehicle much more feasible.⁹¹ This maybe the reason for why plug-in hybrids may be the best option at this very moment to use, due to having an in-built, backup gasoline engine, in case of battery shortages.⁹²

⁸⁷ *See id.*

⁸⁸ *See id.*

⁸⁹ *See id.*

⁹⁰ *See id.*

⁹¹ *See id.*

⁹² *See id.*

Another factor that is mentioned to minimal degree, albeit very significant, is the infrastructure that needs to be put in place to enable time of use pricing.⁹³ Time of use pricing is where the cost of the energy varies based upon when the public uses it.⁹⁴ To maintain stability for the energy supply required by electric vehicles, is a tall task, and always requires reliable electricity supply which is balanced with the demand from the public.⁹⁵ To avoid the economically costly impacts of high-voltage charging, regulators such as grid managers may choose to influence the time during which owners charge their electric vehicles.⁹⁶ Thus, by allowing the cost of the electricity to vary with the price to charge a vehicle, consumers could be encourage to charge their transporting vehicles at times when the cost to produce such energy is low.⁹⁷ If the number of electric vehicles that are sold in the United States increases substantially over the days, the capacity that needs to be expanded in terms of energy generation might increase, particularly to suffice additional electricity demand to charge these vehicles.⁹⁸

Regardless of how alike they are to the human eye, it is important to understand that these vehicles survive and progress in different manners and with different supporting systems. That is the case with traditional vehicles and electric vehicles. Electric vehicles require a substantially distinct set of circumstances to develop into what fuel burning cars are today. It is a

⁹³ *See id.*

⁹⁴ *See id.*

⁹⁵ *See id.*

⁹⁶ *See id.*

⁹⁷ *See id.*

⁹⁸ *See id.*

tall task but one that could be completed over time. Although the system to sustain and power these cars is quite already in place, albeit not entirely, there are major advancements and investments that need to be introduced to persuade the general public into believing in these vehicles. Thus far this work has studied the differences in the makeup of the vehicle, the infrastructure differences, and why the field of electric transportation needs to continually develop to help protect the environment. The largest player in deciding how fast this sector of society develops and takes over the existing one, is all dependent on the law. The law decides what incentives could be placed on the infrastructure for these vehicles when owners want to build them and when consumers want to buy them. Our government and the pace at which the regulatory framework is developed to sustain these vehicles, will decide how quickly electric vehicles can take over the transportation sector of our country and how soon our environment could be saved from polluting vehicles.

CURRENT INCENTIVES AND A NEED FOR MORE FEDERAL ACTION

Current State Incentives

Numerous states across the country have implemented incentives persuading the public to switch to electric modes of transportation, acknowledging the dangers of fuel-burning vehicles. One of the states most supporting this revolution is California. In the United States, problems associated with air pollution from mobile and stationary sources have resulted in federal government intervention, but the air quality standards applied by the federal government could be expanded upon by individual states if the state government wanted it to be so, however this was not the case for mobile sources such as cars, trucks, buses, etc.⁹⁹ The only state that was exempt from this, was California.¹⁰⁰ California's air regulations were much more stringent, thereby creating two sets of standards that could be followed within the country, the Federal set of regulations or California's regulations.¹⁰¹ In fact, during the Trump administration, California's authority to set its own regulations was pulled back, causing scholars to argue that the Environmental Protection Agency does not sustain the power to do so.¹⁰²

⁹⁹ Chiaro Pappalardo, *What a Difference a State Makes: California's Authority to Regulate*

Motor Vehicle Emissions Under the Clean Air Act and the Future of State Autonomy, 10

MICH. J. ENVTL. & ADMIN. L. 169 (2020).

¹⁰⁰ *See id.*

¹⁰¹ *See id.*

¹⁰² *See id.*

California has always looked at motor vehicle emissions in a much more magnified manner than the rest of the country, which is clear considering California, in 1966, had established the first tailpipe emission standards in the nation, followed by the California Air Resources Board, which was established three years prior to the federal Clean Air Act (CAA) which expanded on the 1967 Air Quality act.¹⁰³ The CAA which had expanded on the 1967 Air Quality Act, recognized California's efforts and allowed the state to set its own separate vehicle emission regulations which were stricter than federal vehicle emissions.¹⁰⁴ The federal government realized that allowing every state to have its own vehicle emission regulations would be costly for manufacturers and the automotive industry, forcing them to comply with fifty different sets of rules, therefore federal preemption was necessary and represented a compromise to this dilemma.¹⁰⁵ However this preemption did not affect California.

How California is able to establish its own air quality regulations, while all other states cannot is a very vital question. Title II of the CAA preempts states from adopting their own emission standards for motor vehicles, however this exempted California because, under section 209(b) of the CAA, any state which had adopted emission standards prior to the date of March 30th, 1966, can waive the application of this section.¹⁰⁶ Due to the reason that California had established its own tailpipe emission standards before March 30th, 1966, California qualifies for

¹⁰³ *See id.*

¹⁰⁴ *See id.*

¹⁰⁵ *See id.*

¹⁰⁶ *See id.*

the preemption waiver.¹⁰⁷ Additionally, by granting California the right to set different and more stringent standards, Congress also identified California as a “testing area” for innovative and ambitious air pollution control strategies, which, if they were successful, would then roll out onto the federal level.¹⁰⁸ Years later, in 1977 after the amendments to the CAA, Congress decided to substantially revise this waiver, and further expanded the deference to California by removing the original requirements that each California standard needs to be more stringent than the federal standard and also adapted a provision allowing other states to adopt California’s standards instead of national standards.¹⁰⁹ However, there were conditions attached to the waiver, which were; California’s standards are at least as protective as federal standards and the state’s determination of the fact was not arbitrary and capricious, California’s standards are needed to be met with compelling and extraordinary conditions, and California’s standards are not inconsistent with certain CAA provisions related to technical feasibility and lead time to manufacturers.¹¹⁰

Over the years California has been active in creating incentives that help customers save money when switching to modes of electric transportation. The purpose of these incentives or

¹⁰⁷ *See id.*

¹⁰⁸ *See id.*

¹⁰⁹ *See id.*

¹¹⁰ CALIFORNIA AIR RESOURCES BOARD CALIFORNIA & THE WAIVER: THE FACTS | CALIFORNIA AIR RESOURCES BOARD, <https://ww2.arb.ca.gov/resources/fact-sheets/california-waiver-facts> (last visited Apr 15, 2022)

subsidies, is to implement measures such as tax credits and incentives for citizens to purchase vehicles that either run on completely or partially on clean energy.¹¹¹ Section 5899.3 of the California Streets and Highways Code acknowledges that electric vehicle charging infrastructure is a necessary component to transitioning to increased electric vehicle usage.¹¹² In addition, the foregoing code understands the cost of installing electric vehicle charging infrastructure prevents property owners from making these improvements, and in order to promote this installation, this code allows authorized public officials and property owners to enter into voluntary contractual assessments to finance installation of electric charging infrastructure.¹¹³

California offers nearly three dozen state incentives to facilitate the growth of the electric vehicle market, which include rebates for electric vehicle supply equipment, exemption from high occupancy road tolls, vehicle replacement incentives, emissions reductions grants, technology advancement funding, and vouchers applicable to the purchase price of low-emission trucks and buses.¹¹⁴

Pennsylvania is another state that incentivizes electric transportation. As early as 1992, Pennsylvania established the Alternative Fuels Incentive Grant (AFIG), which is catered towards

¹¹¹ Dan Ziebarth, *ARTICLE: Easing Off the Gas: Efficient and Equitable Policy for Passenger Vehicle Emissions Reduction*, 47 *ECOLOGY L. CURRENTS* 254 (2020).

¹¹² CAL. STS. & HY. CODE § 5899.3 (2021).

¹¹³ *See id.*

¹¹⁴ Kate Kahlert, *Transportation Electrification: An Examination of the Utility's Role*, 46 *MITCHELL HAMLINE L. REV.* 91 (2019).

vehicle fleets, operated by school districts, municipal authorities, and other corporations, rather than individual customers.¹¹⁵ The priorly listed entities can receive funds between \$1,000 and \$7,500 per electric passenger vehicle.¹¹⁶

Another form of incentive that the state of Colorado is following is a statewide tax credit program that is applicable to leasing, purchasing, or converting vehicles.¹¹⁷ Passenger vehicles can receive a tax credit of up to \$5,000 on the purchase of electric vehicles within the state.¹¹⁸

Finally, the state of Florida has codified an infrastructure plan to promote the usage of electric transportation. The Florida state legislature acknowledged that in order to mitigate the dangers carbon dioxide emissions pose on the environmental health of the state, adaptation of electric vehicles will strongly benefit the state.¹¹⁹ The legislature also states that due to an emerging electric vehicle market, prompt installation of reliable charging stations, that support both short and long range electric vehicle travel, is necessary.¹²⁰ The legislature also encourages building partnerships with local governments, state and federal entities, electric utilities, the

¹¹⁵ Ziebarth, *supra* note 111.

¹¹⁶ *See id.*

¹¹⁷ *See id.*

¹¹⁸ *See id.*

¹¹⁹ FLA. STAT. § 339.287 (2021).

¹²⁰ *See id.*

public, and the business community in order to develop and build electric vehicle charging infrastructure and diminish roadblocks.¹²¹

In Florida, the state has also tried to benefit the public by providing them with the location of more charging stations that have not been previously known. The legislature asks operators of charging stations or owners to provide the Department of Agriculture and Consumer Services with information such as the type of alternative fuel at the station, the station's name and address, and the fees or costs among other requisite information, which is then posted on the Department of Agriculture and Consumer Services' website for the public to see.¹²²

Although incentives have been created from state to state to encourage a shift towards electric vehicles, some scholars believe that disincentivizing driving and promoting the use of public transportation could help ease environmental damage. The argument is that states can achieve the goals of protecting health and human welfare from vehicle emissions by disincentivizing driving by charging an additional fee during vehicle registration or vehicle renewal that could then be used to fund development and improve public transportation infrastructure.¹²³ The fee would change based upon the vehicle's carbon footprint.¹²⁴

¹²¹ *See id.*

¹²² FLA. STAT. § 377.815 (2021).

¹²³ Castaline, *supra* note 21.

¹²⁴ *See id.*

A Discussion About Federal Incentives

Although individual states have taken it upon themselves to incentivize electric vehicles, a larger involvement of the federal government will benefit the environment. In Chapter 1 of Title 23 of the United States Code, it is stated that the Secretary shall ensure plans and specifications for each proposed highway project under this chapter and provide for a facility.¹²⁵ The chapter details a need for electric vehicle charging stations, and states that, electric vehicle charging infrastructure that is installed by using funds provided from this chapter, shall at a minimum, provide charging connectors that meet applicable industry safety standards, open access to payment methods to ensure security, convenience, and equal access to the electric charging infrastructure without bias towards a particular payment provider.¹²⁶

Under the same Title, in § 151, the United States Code discusses national corridors for electric vehicle charging, hydrogen, propane, and natural gas fueling. This section states that, “The Secretary shall periodically designate national...electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas feeling infrastructure, at strategic locations along major national highways to support changes in the transportation sector to help achieve a reduction in greenhouse gas emissions...”¹²⁷ In addition § 151 discusses how the Secretary can require collaborative engagement with stakeholders such as automobile manufacturers, electric charging providers, technology providers, States, infrastructure constructors, and local governments, among others, to foster public-private or

¹²⁵ 23 U.S.C. § 109 (2022).

¹²⁶ *See id.*

¹²⁷ 23 U.S.C. § 151 (2022).

private investment in electric charging infrastructure and to expand deployment of electric vehicle charging infrastructure.¹²⁸

By reading the United States Code, it is clear that lawmakers are trying to craft reasonable laws to adapt to electric transportation and help aid its growth. However, merely endorsing the importance of switching to electric transportation does not entice large part of the general public to switch to modes of electric transportation. Incentivizing electric transportation will bring about this switch. Up until the year 2021, prior to President Biden's trillion dollar infrastructure plan, the incentives in place when an electric vehicle is purchased is a tax credit, with a minimum of \$2,000 and up to \$7,500, based on each vehicle's battery capacity and gross vehicle weight rating, as listed on the U.S. Department of Energy's website.¹²⁹ This incentive has changed with the arrival of the Biden administration.

Incentivizing charging infrastructure has factually increased the amount of electric vehicles on the road, correlation has shown that more incentives equals more charging outlets,

¹²⁸ *See id.*

¹²⁹ ELECTRICITY LAWS AND INCENTIVES IN FEDERAL ALTERNATIVE FUELS DATA CENTER:

ELECTRICITY LAWS AND INCENTIVES IN FEDERAL,

[https://afdc.energy.gov/fuels/laws/ELEC?state=US#:~:text=Qualified%20Plug%2DIn%20Electric%20Vehicle%20\(PEV\)%20Tax%20Credit&text=The%20minimum%20credit%20amount%20is,the%20gross%20vehicle%20weight%20rating](https://afdc.energy.gov/fuels/laws/ELEC?state=US#:~:text=Qualified%20Plug%2DIn%20Electric%20Vehicle%20(PEV)%20Tax%20Credit&text=The%20minimum%20credit%20amount%20is,the%20gross%20vehicle%20weight%20rating). (last visited Apr 5, 2022).

and more charging outlets means higher electric vehicle sales.¹³⁰ The federal government, was only providing its incentives, which is the tax credit of anywhere from \$2,000 to \$7,500, such that it only applies to purchasing electric vehicles from companies that have not sold over 200,000 total EVs already.¹³¹ Therefore, if a consumer would want to buy an electric vehicle from Tesla, the largest and most successful EV company, they would not be able to reap the benefits of switching to an EV because they don't qualify to receive the tax credit.¹³² The only incentive in place to support business looking to install charging stations, or gas stations attempting to convert to EV charging stations, is the Alternative Fuel Infrastructure Tax Credit, which only provides a credit of up to 30% of the cost up to \$30,000 for installing an EV charger.¹³³ The only problem is, the credit is not enough, because the cost of installing an EV charger is \$64,000 and taking in the 30% tax credit, leaves the installer at \$44,975 to install *one* electric vehicle charging station.¹³⁴

Although incentives and consideration for electric vehicles needs to be larger, the legislators of our country do understand that developing a larger electric vehicle charging infrastructure is paramount and can lead to larger sales due to less range anxiety.¹³⁵ A bill

¹³⁰ Shahil Patel, *Electric Vehicle Limbo: The Need for Charging Incentives*, 8 EMORY CORP.

GOVERNANCE & ACCOUNTABILITY REV. 75 (2021).

¹³¹ *See id.*

¹³² *See id.*

¹³³ *See id.*

¹³⁴ *See id.*

¹³⁵ *See id.*

introduced in the 116th Congress titled H.R. 5770: EV Freedom Act, aims to establish a national network of EV stations, and although it died in 2016, it did show the role the federal government can play in creating an electric vehicle charging infrastructure, nationwide.¹³⁶

In addition, as of 2021, President Biden's Build Back Better Agenda and the Bipartisan Infrastructure Deal invests in the EV with the intent to tackle the climate crisis.¹³⁷ The President was to sign an Executive Order that sets an ambitious target of making half of all newly sold vehicles in 2030, zero-emission vehicles, which includes battery electric vehicles, plug-in hybrid electric vehicles, or fuel-cell electric vehicles.¹³⁸ In addition, the Environmental Protection Agency (EPA) and the U.S. Department of Transportation (USDOT) are advancing smart fuel efficiency and emission standards that would deliver around \$140 billion in net benefits, save about 200 billion gallons of gasoline, and reduce around 2 billion metric tons of carbon pollution over the life of this program.¹³⁹ President Biden's administration will also be investing in; installing a first-ever national network of electric vehicle charging infrastructure and delivering

¹³⁶ *See id.*

¹³⁷ FACT SHEET: PRESIDENT BIDEN ANNOUNCES STEPS TO DRIVE AMERICAN LEADERSHIP FORWARD ON CLEAN CARS AND TRUCKS THE WHITE HOUSE, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/> (last visited Apr 17, 2022).

¹³⁸ *See id.*

¹³⁹ *See id.*

point-of-sales incentives among others.¹⁴⁰ Together these advancements would ideally put the country on track to reducing greenhouse gas emissions by more than 60% in 2030.¹⁴¹

Incentive wise, President Biden's \$1 trillion dollar infrastructure bill, which is now law, changes the \$2,500 to \$7,500 incentive, to up to \$12,500 per vehicle.¹⁴² The proposed incentive includes \$7,500 tax credit to purchase a plug-in electric vehicle as well as \$500 if the vehicle's battery is made within the country and an additional \$4,500 if the vehicle was assembled domestically with union labor.¹⁴³ While the Biden Administration has fully backed this tax credit, alleging that such a high incentive is necessary to reaching ambitious goals established by the administration by the year 2030.¹⁴⁴ Critics of the bill such as Toyota Motor and Tesla CEO, Elon Musk, have alleged that the incentive favors unions such as the United Auto Workers union that represents plant workers of Detroit automakers.¹⁴⁵ Obviously the effectiveness of the

¹⁴⁰ *See id.*

¹⁴¹ *See id.*

¹⁴² EV TAX CREDITS IN BIDEN'S BUILD BACK BETTER ACT WILL HELP SELL MORE CARS THAN NEW CHARGERS IN INFRASTRUCTURE BILL CNBC, <https://www.cnbc.com/2021/11/19/ev-tax-credits-in-bidens-build-back-better-act-will-help-sell-more-cars-than-new-chargers.html> (last visited Apr 17, 2022).

¹⁴³ *See id.*

¹⁴⁴ *See id.*

¹⁴⁵ *See id.*

incentives cannot be judged already, but a hope for success resonates throughout the administration and EV supporters.

Countries across the globe have made declarations to electrify their transportation sector. China, which is the world's largest auto market, stated its intention to cease the production and sale of traditional energy vehicles in the near future, while India plans to sell only EVs and hybrids by 2030.¹⁴⁶ On the federal level of our government it is important to develop newer and vital incentives to expand the growth of EVs. As of now, electric utilities partner with local governments and states to provide incentives for EVs and EV charging.¹⁴⁷ For example, all European Union member states, with the exception of Lichtenstein offer some combination of incentives such as purchase subsidies, reduced ownership costs, financial support to the EV industry, and local incentives.¹⁴⁸

¹⁴⁶ Alexandra B. Klass, *Public Utilities and Transportation Electrification*, 104 IOWA L. REV. 545 (2019).

¹⁴⁷ *See id.*

¹⁴⁸ *See id.*

CONCLUSION

Throughout the United States a need to address the health of our environment and make a change regarding it, is starting to become a focal point. Transportation has almost grown to be an essential for humankind and as our population grows, the usage of vehicles will increase as well. Traditional, fuel-burning vehicles emit greenhouse gases, such as carbon dioxide, which contribute to increasing the temperature of our planet, a process commonly known as global warming. Global warming contributes to climate change and eventually leads to natural disasters, such as earthquakes, tsunamis due to increase sea levels, and ocean acidification, resulting in loss of life. This process also negatively impacts the environment. Although we cannot simply avoid using transportation forever, it is vital to make the mode of transportation we use, environmentally safer.

Electric vehicles are necessary for the environment. Different models of electric vehicles are available for use and as are Hybrids, a vehicle relying on a combination of a traditional fuel-burning engine and an electric engine to help it run. Although electric transportation is available, many still fear the swap. That is where incentives, from state and federal legislatures, can make a significant difference. Numerous states like California have addressed the need for charging stations to power electric vehicles for trips. Florida, among other states, has addressed the need to build these charging stations making it feasible for operators of electric vehicles to travel both short and long distance.

Although the states' standards and federal standards for air regulations may not co-exist, it is vital for the federal government to enact incentives and programs promoting the usage and switch to electric transportation. On the federal level, air standard regulations act as a base for

how states should implement their standards. Federal codes should address incentives and enact them at a much pronounced level than states to facilitate the expansion of electric vehicle operation in the United States.

Such incentives are hard to draft and even harder to roll out and put into effect due to fickle details that are hard to iron out. However, an incentivized solution to expand the use of electric vehicles could be one where, the federal government keeps the \$12,500 tax credit per electric vehicle purchase, obviously depending upon whether the battery and the vehicle is assembled within the country, otherwise leaving the credit at \$7,500, but also advances newer incentives. Such as, an incentive on a scale where the tax credit is from \$5,000 to \$10,000, based upon battery capacity and not based upon whether it was made within the country, making EV's by any manufacturer appealing. In order to ensure the federal government has the money to do this, the federal government can tax manufacturers who still wish to sell fuel-burning vehicles within the United States, which eventually raises the price of the vehicle, disincentivizing the public to purchase it. This incentive could be then rolled back when the sales of EVs in the country exceeds the sales of traditional fuel-burning vehicles. However the tax on manufacturers who wish to continue to sell traditional vehicles, should be kept as is. This would also enable manufacturers wishing to sell their vehicles within the United States to be seen under the same eye, not favoring local manufacturers, thereby increasing the availability of EVs.

Another incentivized solution could be one where, the federal government taxes manufacturers for selling traditional vehicles, increasing the average price of regular fuel-burning modes of transportation, and simultaneously requiring the manufacturer to incentivize ½ of what the federal government would incentivize, for fully-electric vehicles. For example, if

based upon battery capacity, a customer were eligible for a \$7,500 tax credit, the manufacturer is only eligible to credit \$3,250 on the vehicle and use the rest of the money, or in this case the rest \$3,250 on building charging station infrastructure. If the manufacturer does not build charging infrastructure, the money would be provided to the federal government, who would ideally seek out private or public entities wishing to build charging station infrastructure and sponsor them. This would both disincentivize the manufacturer to sell fuel-burning vehicles due to an increased tax and also disincentivize the customers to purchase a traditional vehicle for a higher price. If a manufacturer is not wishing to sell any fuel-burning vehicles, the tax will be voided and the manufacturer will only need to incentivize their EVs.

Along with the foregoing, owners of EVs should be exempt from paying high occupancy road tolls. In order to expand the use of EVs, it is not only vital to incentivize EVs, but also vital to disincentivize traditional, fuel-burning vehicles, for both the manufacturer to sell and the customer to purchase.

Although the foregoing are suggestions, there are very many minute details between the federal government, state governments, and private entities which need to be discussed and ironed out in order to be put into effect. However, creative, and successful incentives need to be drafted and proposed in order for the United States to reach its ambitious energy goals as proposed by President Biden.

Electric transportation is the key to a safer, healthier environment. Over the years, developing science and technology has shed light on the impact fuel-burning transportation imposes on our environment. It is vitally essential that the federal level of the United States

government reacts upon this knowledge and persuades its citizens to shift towards electric transportation by incentivizing their use to help contribute to protecting the environment.

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