

Potential Impacts of Alternative Fuel Vehicles on Transportation Revenue in North Carolina

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I. Estimated Impact of Alternative Fuel Vehicles (AFVs) on Transportation Revenue in North Carolina

Estimated Impact of Electric Vehicles on Transportation Revenue

Because electric vehicles (EVs) do not use gasoline, their operation does not generate revenue from a gas tax, which is one of the primary means that North Carolina uses to fund transportation projects. In order to capture lost gas tax revenue, North Carolina charges a registration fee of \$130 annually on all-electric (not hybrid or plug-in hybrid) passenger vehicles.¹

The North Carolina Clean Energy Technology Center estimates that the current lost revenue due to electric vehicles is approximately \$1.1 million annually. On a per vehicle basis, that is approximately \$100 per vehicle. This implies that electric vehicle owners are providing approximately \$30 per year more revenue than a driver of a vehicle of similar size and model year. The surplus that electric vehicle drivers provide totals approximately \$360,000 annually. Projecting forward to 2025, the lost gas tax per vehicle is between \$103 and \$110 per vehicle. Assuming that the electric vehicle registration fees remain the same, there will still be a surplus of roughly \$20 to \$27 per electric vehicle. The reason the lost gas tax goes up in the future is entirely due to a projected increase in tractor trucks, which consume large amounts of fuel. Excluding tractor trucks, the lost gas tax per vehicle is approximately \$100 per vehicle. If Executive Order 80 achieves its goal of putting 80,000 electric vehicles on the road, there could be a surplus of over \$2 million in 2025. If there are 40,000 electric vehicles, the surplus would be about half that at approximately \$1 million and if there are 20,000 electric vehicles on the road in 2025, the surplus would be about \$400,000.

Currently, the annual fee on all-electric vehicles only applies to passenger vehicles. While our model does not assume that by 2025 there will be large numbers of electric tractor trucks on the road that to greatly affect transportation revenue, it should be noted that due to their heavy fuel use, if growth in this sector occurs more rapidly than projected, it would have a significant impact on transportation revenue. At the current time, there is one electric tractor truck registered in North Carolina. Assuming it has an average mileage, the state is losing approximately \$3800 annually in gas tax from that single truck. Applying the vehicle registration fee of \$130 to tractor trucks would barely make a dent in the deficit on a per vehicle basis. We recommend that thought be given to addressing this shortcoming before it becomes a larger problem. The growth in electric tractor trucks is expected to lag behind light duty and medium duty uses because the technology still has significant shortcomings for heavy duty uses, and the expectation is that it will take longer for the technology to truly be comparable to diesel.²

It is not possible to identify plug-in hybrid electric vehicles separately from hybrid electric vehicles using fuel codes from the DMV so we did not consider them separately in our analysis. Executive Order 80 is

¹ https://www.ncleg.gov/EnactedLegislation/Statutes/HTML/ByChapter/Chapter_20.html

² North American Council on Freight Efficiency, "Executive Summary: Electric Trucks Where They Make Sense", May 2018. <https://nacfe.org/report-library/guidance-reports/>

aimed at zero-emission vehicles, which does not include plug-in hybrid electric vehicles. The goal of 80,000 zero-emission vehicles in 2025 implies 80,000 all electric vehicles.

Table 1: Estimated Impacts on Transportation Revenue

	Current	2025		
		80000 EV's	40,000 EV's	20,000 EV's
Lost Gas Tax Per Vehicle	\$ 99	\$ 103	\$ 103	\$ 110
Total Lost Gas Tax	\$ 1,152,229	\$ 8,224,068	\$ 4,112,071	\$ 2,197,040
EV Registration Revenue	\$ 1,513,850	\$ 10,400,000	\$ 5,200,000	\$ 2,600,000
Surplus from Evs	\$ 361,621	\$ 2,175,932	\$ 1,087,929	\$ 402,960

Methodology

The North Carolina DMV provided aggregated data on all currently registered vehicles in North Carolina according to their fuel type and body type. Using the 2017 National Household Travel Survey data³ (the most recent year available from USDOT) for North Carolina, we were able to estimate the distribution of ages of vehicles in North Carolina. We applied that to the aggregate data from DMV to estimate the rough distribution of model years by body type for vehicles in North Carolina. We estimated the average fuel economy for each model year by body type based on likely footprints of the vehicles and Corporate Average Fuel Efficiency (CAFE) Standards.⁴ We took the electric vehicle sales data from North Carolina from the Auto Alliance⁵ for each year to estimate the rough ages of electric vehicles likely on the road today (due to cars being sold out of state, brought in from other states, or retired from service, this is only an estimate).

With this data, we were able to estimate how many electric vehicles of each model year are in use. We assumed the distribution would match the current distribution in terms of body types for each year. Using the 2017 National Household Travel Survey data, we used the average annual mileage driven in North Carolina to determine what a gasoline vehicle of similar body type and year would consume annually. For tractor trucks we took the national average for fuel consumed annually according to the most recent year available from USDOT’s Bureau of Transportation Statistics (2015) and used that to estimate lost gas tax.⁶ The sum of all of these together was the estimated lost gas tax from electric vehicles for the current vehicles registered in North Carolina. By dividing by the number of registered electric vehicles, we got the lost gas tax per vehicle.

When projecting forward, we used the 2025 CAFE Standards for different body types (assuming that the proposed federal SAFE Vehicles Rule⁷ goes into effect) to estimate the lost gas tax. For tractor trucks we reduced the fuel consumption by 25% from 2015 levels, which is within the likely range of reductions for that model year. We generally assumed that the distribution on body types would be similar in the

³ <https://nhts.ornl.gov/>

⁴ <https://www.nhtsa.gov/laws-regulations/corporate-average-fuel-economy>

⁵ <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/>

⁶ <https://www.bts.gov/content/combination-truck-fuel-consumption-and-travel>

⁷ <https://www.nhtsa.gov/corporate-average-fuel-economy/safe>

future as it is today, with one major change. We assumed that tractor trucks would grow at a much slower rate. Current estimates on technology changes indicate that light duty and medium duty vehicles will be more quickly competitive with their gasoline or diesel counterparts than heavy duty applications, especially long-distance heavy duty applications.⁸ The rate of growth of tractor trucks is likely the most significant factor that could impact the outcome of our estimate. Tractor trucks are a heavy fuel user so changes in the rate of adoption of electric technologies could greatly alter the amount of transportation revenue gained from them.

Electric transit buses are expected to show significant growth in use but since transit agencies are public agencies that are tax-exempt, we did not include them in our analysis because growth in that sector would be revenue neutral. Further details of our analysis are included in the Appendix.

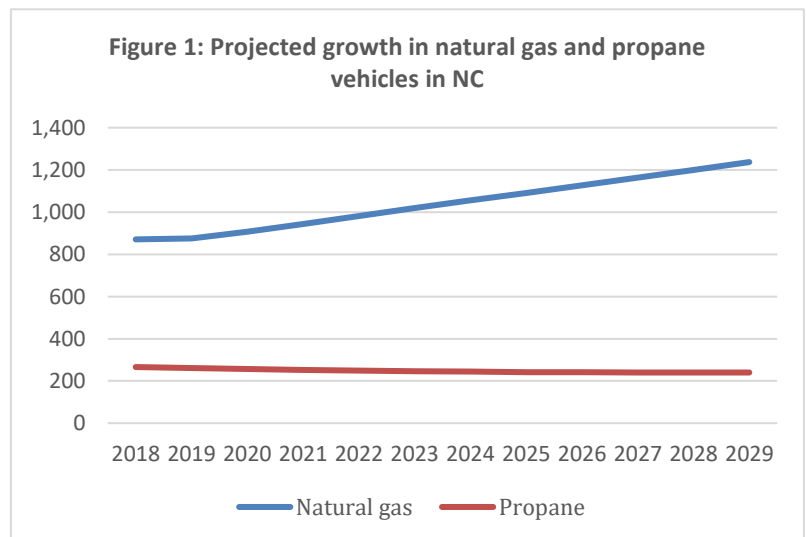
Impacts of Other Alternative Fuels

In 2017, the Department of Revenue made clarifications to the rules regarding the motor fuel tax that erased previously existing differences in tax revenue collected from propane and natural gas.⁹ These fuels are now all taxed according to their gasoline or diesel gallon equivalent so there is no lost revenue compared to gasoline or diesel. The NC Department of Revenue also closed a loophole that previously excluded ethanol and biodiesel imported by marine vessels.¹⁰

Estimated growth in alternative fuel vehicles other than electric vehicles

In order to estimate the growth in alternative fuel vehicles other than electric vehicles in North Carolina, we started with the DMV data that was broken down by vehicle type and fuel type. We matched the vehicle types to the following categories: cars, light duty trucks, medium duty trucks, and heavy duty trucks to get the current numbers. We used EIA data from the

Annual Energy Outlook 2019 for vehicle stocks for each of those vehicle classes and projected forward, assuming that North Carolina would show the same rate of growth as the nation.

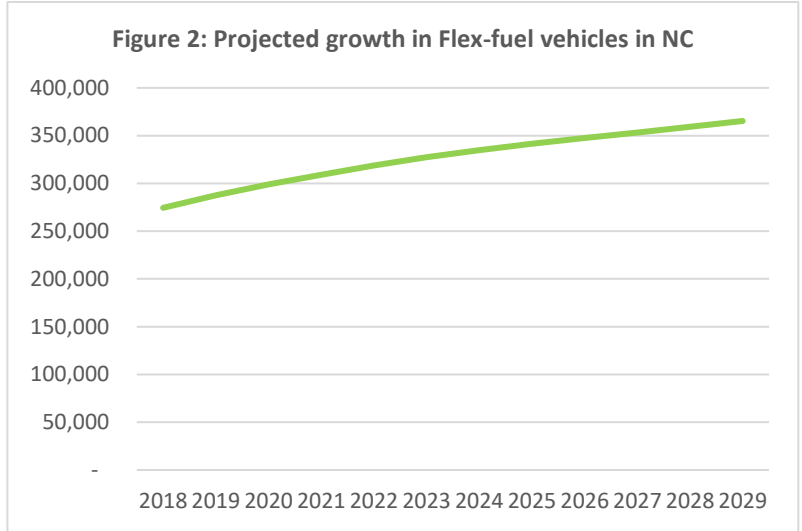


⁸ North American Council on Freight Efficiency, “Executive Summary: Electric Trucks Where They Make Sense”, May 2018. <https://nacfe.org/report-library/guidance-reports/>

⁹ <https://www.ncdor.gov/documents/notice-regarding-clarification-excise-tax-reporting-requirements-alternative-fuels-march-15-2017>

¹⁰ <https://www.ncdor.gov/documents/notice-regarding-excise-tax-fuel-grade-ethanol-or-biodiesel-fuel-effective-august-11-2017>

Natural gas vehicles are expected to grow by 42% over the next 10 years, due to growth in the medium duty and heavy duty market. Flex-fuel vehicles (which can use gasoline or E85 ethanol) are expected to grow by 33%, due to growth in the medium duty market. Propane is expected to decrease by 10% and decreases across all markets. We believe that the current DMV data for propane undercounts the number of propane vehicles in the state, since many of them are converted after-market to use propane, but this would not significantly affect the rate of growth.



II. Overview of other states approaches to reducing the impact of alternative fuel vehicles on transportation revenue

Background

As the number of alternative fuel cars and trucks is expected to grow in the United States, state governments are considering options to ensure that drivers of these vehicles are contributing a fair share to transportation infrastructure, construction, and maintenance programs.

In this policy review, alternative fuel vehicles can include, electric, hybrid, propane, and natural gas vehicles. There are several types of electric vehicles, including battery electric vehicles (BEVs) that use no petroleum, plug-in hybrid electric vehicles (PEVs), and hybrid electric vehicles (HEVs).

As vehicle efficiency improves, the vehicle driver pays less in motor fuel related taxes because they use less gas or diesel fuel. Hybrid vehicles average about 50 miles per gallon and electric vehicles can get over 130 miles per gallon (electric equivalent) while the current average for the US vehicle stock is approximately 25 miles per gallon. Non-hybrid gasoline and diesel vehicles have also been increasing in fuel efficiency due to higher CAFE Standards.

States can tax alternative fuels and/or alternative fuel vehicles to generate revenue. In NC, alternative fuels (ethanol, propane, and compressed natural gas) are converted to gasoline gallon equivalent (GGE) or diesel gallon equivalent (DGE) and are charged the state motor fuel tax. Other states collect per-gallon excise tax on the use of alternative fuels. Furthermore, some states apply the general sales and use tax to purchase of alternative fuel. Some states, like Oregon, are launching pilot programs to tax drivers by their total vehicle miles traveled (VMT) rather than by how much fuel they consume.

Currently, the American Petroleum Institute (API), estimates that total state taxes and fees on gasoline in North Carolina is 35.35 cents per gallon. Comparatively, NC's total gas tax rate is ranked 14th of the 50 states.¹¹ The Tax Foundation has also calculated the share of state and local road spending that is covered by state and local tolls, user fees, and user taxes. In NC, they estimate that 63.2 percent of state/local road spending is covered by state tolls, fees, and taxes. In this category North Carolina ranks 8th of the 50 states.¹²

Additionally, many states have created fees, permits, decals, or special license plates that allow alternative fuel vehicles owners to pay annual fees in lieu of an excise tax. The structure of these fees vary with most states administering fees per vehicle. A few states have imposed fees on dealers of alternative fuels.

In summary, the common methods for generating revenue from alternative fuel vehicles, include:

- 1) Fees on EVs, including battery electric vehicles, plug-in hybrid EVs, and hybrid vehicles.
 - a. Registration fees - paid annually

¹¹ <https://taxfoundation.org/state-gas-tax-rates-july-2018/>

¹² <https://taxfoundation.org/state-road-funding-2017/>

- b. License fees - paid once per ownership
- 2) Fees on other alternative fuels and alternative fuel vehicles (propane, natural gas, ethanol)
 - a. Vehicle fees
 - b. Dealer fees for alternative fuels
- 3) VMT-based fees - typically called Mileage-based Users Fees (MBUF)
- 4) Excise tax on fuels, including propane, natural gas, and/or ethanol

Types of Actions

Fees on EVs

A total of 21 states have enacted legislation creating registration fees for electric vehicles. However, the Oklahoma Supreme Court found the bill unconstitutional because it did not meet state mandates for the passage of a revenue bill. As a result, 20 states have active EV registration fees.

Details related to the 20 states with active EV registration fees are outlined in ***Appendix A - Registration Fees for EVs***. The table summarizes fees for BEVs, PHEVs, and hybrid vehicles and outlines a few details for how states are implementing these fees.

In North Carolina, BEV and PHEV owners are required to pay a fee of \$130 per year. This cost is in addition to traditional registration fees and taxes. The current registration fee was enacted by HB97 in 2015. Previously, HB 1449 (2017) had created an EV fee of \$100 per year.

Collecting lost transportation revenue is typically one of the rationales used to justify the creation of registration or license fees for EVs. In particular, BEVs are powered by electricity without the use of any petroleum fuels.

EV fees for BEVs range from \$50 to \$200 per year. Of the 20 states with EV fees, legislation varies for how fees are applied to PHEVs and HEVs. Sixteen states apply fees to PHEVs with fees ranging from \$20 to \$130 per year. And five states include hybrids in their EV fee structures; these fees range from \$10 to \$70 per year.

Fees on Other Alternative Fuels and Vehicles (including propane, natural gas, ethanol)¹³

Some states have created fees for other alternative fuel vehicles, including vehicles fueled by natural gas, propane, and ethanol. These fees may be collected from drivers on an annual basis or collected from dealers / suppliers of alternative fuel. Annual decals or fees due at vehicle registration are the most common. These fees may be in lieu of or in addition to fuel excise taxes paid for fuel at the pump.

Currently, 13 states apply annual fees to alternative fuel vehicles. Kansas, Indiana, Texas, and Washington require decals, permits, or fees for propane alternative fuel vehicles (cars and trucks). Natural gas and propane vehicles in Oregon and Oklahoma are subject to annual fees in lieu of state fuel tax.

It can be difficult to track and identify the multitude of fees for different types of fuels. Most states have different programs for managing the fees and/or taxes on different alternative fuels. However, a few states have a system of registration fees or decals that cover all alternative fuel types (including propane, natural gas, and electric vehicles). For example, Missouri has special fuel decals for each

¹³ <https://afdc.energy.gov/laws/state>

alternative fuel vehicle type which are managed through a single program within the Department of Revenue. And, in Nebraska, any vehicle powered by an alternative fuel is subject to an annual registration fee of \$75.

Seven states - including Delaware, Florida, Indiana, Michigan, Minnesota, Montana, and Wisconsin - require dealers of alternative fuel get a license or pay an additional fee in order to distribute or sell alternative fuels.

VMT-based Fees

A Mileage-Based User Fees (MBUF) or a vehicle miles traveled (VMT) fee can levy a user fee on miles driven in a specific vehicle rather than applying the current excise tax based on fuel consumed (cents per gallon). Currently, no states have implemented a MBUF or VMT-fee completely for an entire state. However, many states are operating pilot programs for residents who have opted in to participate in various programs.

A VMT-base fee could be applied simply on a cents per mile basis. Or, a more sophisticated system can account for factors like location, congestion, emissions, and/or type of vehicle.

Oregon has been studying, testing, and implementing various MBUF programs since 2001.¹⁴ More details about Oregon's experience with VMT-based fees are summarized below.

The Fixing America's Surface Transportation (FAST) Act of 2015 established the Surface Transportation System Funding Alternatives (STSFA) to explore "alternative revenue mechanisms" needed "to maintain the long-term solvency of the Highway Trust Fund."¹⁵ The STSFA program provides states \$15-20 million per year from 2016-2020 to demonstrate new projects, enhance existing demonstrations, or carry-out pre-demonstration activities. The majority of funds awarded are being used to deploy pilot programs for VMT- based fees and other road user charges. Pilot programs were funded to address challenges like public acceptance, privacy protection, equity and geographic diversity.

Appendix B - Mileage-Based User Fee Programs outlines many of the recent or on-going pilot projects that are studying the impacts of VMT-based fees.

Excise Tax on Alternative Fuels

In order to address the issue of potential lost tax revenue from gasoline and diesel, some states have pursued special taxes on alternative transportation fuels like natural gas, propane, and ethanol. Most states have dedicated the revenue from excise taxes on alternative fuel to state transportation or road funds. However, some states have set aside a portion of the funds for other purposes. State excise and sales tax regulation apply to alternative transportation fuel in most states. And a small number of states, including Alabama, Arizona, Florida, New York, do not apply cents-per-gallon state excise tax to alternative transportation fuels. New York provides clearly exempts alternative fuels from fuel excise taxes.¹⁶ Alabama and Florida apply special license or decal fees in lieu of the alternative fuel excise tax. In Arizona, the state has created an alternative fuel vehicle license tax that is based on vehicle value

¹⁴ https://www.oregon.gov/ODOT/Programs/RUF/IP-Road%20Usage%20Evaluation%20Book%20WEB_4-26.pdf

¹⁵ <https://www.fhwa.dot.gov/fastact/factsheets/surftransfundaltfs.cfm>

¹⁶ https://www.tax.ny.gov/pdf/memos/multitax/m16_3m_4s.pdf

Other states, like North Carolina, apply existing state motor fuel taxes to alternative fuels.

Some states with goals related to air quality and climate change or greenhouse gas reduction, must consider how to balance taxes with possible incentives for deployment of vehicles with improved efficiency or lower tailpipe emissions. Many states have considered tax incentives or credits to encourage the use of alternative fuels.

Other Actions

Some states are considering new or different options for increasing transportation revenue.

Although states are attempting to evaluate and project the impact of alternative fuel vehicles on transportation revenue, many states are also considering options for increasing state gas tax for all vehicles and drivers. Since 2012, more than 28 states have enacted legislation that can or will increase overall state gas taxes.¹⁷ These actions are also varied and can include a one-time state gas tax increase, a gas tax increase that is indexed to inflation (or other measures), or is a gas tax increase that is scheduled to increase over time.

A few less common state actions are related to the creation of new tolls or high-occupancy toll (HOT) lanes. Some states or cities have created new options for paid access to existing HOV lanes and/or variable pricing for roads, lanes, or bridges (fees change based on time of day and/or traffic congestion). These types of actions are related to alternative fuel vehicles because states are creating special license plates or decals that allow EVs or alternative fuel vehicles to the HOT or HOV lanes.^{18,19} In areas with heavy traffic or congestion management issues (like Los Angeles or Atlanta), HOV lane access can be an incentive for purchasing an alternative fuel vehicle decal or special plate. Additionally, some states are considering a tax on ride-hailing services, like Uber or Lyft, that have typically avoided the registration or license fees paid by taxi companies.²⁰

¹⁷ <http://www.ncsl.org/research/transportation/2013-and-2014-legislative-actions-likely-to-change-gas-taxes.aspx>

¹⁸ <https://afdc.energy.gov/laws/HOV>

¹⁹ <https://dps.georgia.gov/high-occupancy-vehicle-lanes>

²⁰ <https://www.enotrans.org/etl-material/eno-brief-taxing-new-mobility-services-whats-right-whats-next/>

III. Case Studies

Based on recent activities across the United States, we outline a few examples to demonstrate how various states are addressing this topic.

State Actions to Address Impacts of Alternative Fuel Vehicles on Transportation Revenue

Oregon - VMT / User Based Fees

Legislators and Oregon DOT (ODOT) staff have been studying options for use of mileage-based user fees (MBUF) since 2001. In July 2015, ODOT began offering a program that allows Oregon drivers to volunteer for a program in which drivers of cars or light trucks are charged 1.5 cents per mile driven. Oregon's Road Usage Charge Program, called OReGO, has had more than 1,500 volunteer participants over the first three years of the program. The OReGO program is one iteration of a pilot program that will test three different methods of collecting mileage-based fees. Up to 5,000 participants may be enrolled in the current program. Legislation passed in 2013 created the current program which builds upon other state pilot programs implemented in 2007 and 2012.

The fuel tax paid at the pump is treated as a pre-payment of road charges and credited to drivers' accounts. Drivers who sign up to participate can choose between GPS or non-GPS devices for tracking mileage. The volunteer participants can receive a refund of the state's gas tax if it is warranted based on the vehicle miles traveled. Participants can also choose to have other services, such as engine diagnostics, "find my car" options, and driving badges to provide feedback on driver performance. ODOT performs an administrative role to manage volunteers, oversees contractual obligations and handle tax reconciliation. However, private sector companies manage the volunteer/driver accounts.

In Oregon, fuels tax revenue has continued to increase over time due to population growth and a strong economy; but, revenue is expected to decline beginning in 2020. ODOT is expected to lose \$340 million over the next decade because of increased fuel efficiency of passenger vehicles. Alternative fuel vehicles, including electric vehicles and hybrids, were considered as ODOT contemplated options for addressing the projected decline in fuel tax revenue. The OReGO program report in 2017 states that the "fuels tax is based on a 20th century assumption that fuel purchases mirror road use." Due to increasingly fuel-efficient vehicles, there is now a wider range of fuel efficiency of vehicles on the road. The state chose to take action because the transportation system, including vehicles, technology, and driver behavior, are drastically changing. They find that "because of those changes, road use and fuels tax payments are no longer directly connected. Transportation has evolved, but its funding has not."

Reports from ODT show that staff and legislators considered many options during the course of their study. Other options considered were: implementing a flat fee, taxing electricity for vehicle use, taxing tire purchases, taxing battery purchases, tolling highways, and raising or indexing fuel tax.

During the planning phases, the Road User Fee Task Force (RUFTF) in 2001 and they developed eight overarching criteria to guide the development of an acceptable new revenue source for Oregon. The criteria included: users pay (principle that directly relates use of road infrastructure and services to funding), local government control of local revenue sources (state should not appropriate revenue sources that are traditionally the province of local governments), revenue sufficiency, transparent to the public, nongovernmental burden should be low, readily enforceable, support entire highway and road system, and should be acceptable to the public.

MBUF Reports / Guidance from Oregon:

(2001) Alternatives for the Motor Fuel Tax, Final Report SR 561

<https://www.oregon.gov/ODOT/Programs/ResearchDocuments/AtIMotorFueltax.pdf>

(2007) Oregon's Mileage Fee Concept and Road User Fee Pilot Program http://www.myorego.org/wp-content/uploads/2017/07/RUFPP_finalreport.pdf

(2017) Oregon's Road Usage Charge, The OReGo Program Final Report

https://www.oregon.gov/ODOT/Programs/RUF/IP-Road%20Usage%20Evaluation%20Book%20WEB_4-26.pdf

Georgia - Alternative Fuel License Plate & Annual EV Fees

In Georgia, Alternative Fuel Vehicle owners must pay annual licensing fees. Currently, the fees apply to battery electric vehicles and PHEV or flex fuel vehicle owners that purchase an alternative fuel vehicle license plate.

The Alternative Fuel Vehicle Fees only apply to BEVs, PHEVs, and flex fuel vehicles. The fees do not apply to CNG, LNG, propane, or hybrid vehicles. Under Georgia law, the fees must be adjusted each year based on a formula that includes average motor vehicle fuel efficiency from the previous year and the Consumer Price Index. As of July 1, 2018, the non-commercial motor vehicle fee is \$213.69 and the commercial motor vehicle fee is \$320.54. These fees are currently the highest in the country.

Alternative fuel vehicles with an alternative fuel license plate may use HOV and HOT lanes in Georgia, regardless of the number of passengers. An AFV license plate costs \$80 (plus applicable ad valorem tax) for the first year and costs \$55 for renewal each year.

More information:

<https://dor.georgia.gov/documents/mvd-2018-04-alternative-fuel-vehicle-fees-bulletin>

<https://mvd.dor.ga.gov/motor/plates/PlateDetails.aspx?pcode=AF>

Oklahoma - EV Tax - State Supreme Court Finds Tax Unconstitutional

In 2017, the Oklahoma state legislature passed H.B. 1449 which would create an annual fee of \$100 for electric vehicles and \$30 for hybrid vehicles. The Sierra Club filed a state lawsuit and argued that the fee was unjustified, had no connection to the actual costs and benefits of EVs, and would require EV drivers to pay more than they would in gas taxes. Specifically, the lawsuit claimed that the bill was unconstitutional because it was a revenue-raising bill passed in the last five days of the legislative session when the state was searching to fill a budget gap. In Oklahoma, tax hikes must adhere to strict constitutional requirements and must receive a three-fourths majority vote in each legislative chamber. In ruling on this matter, Justice Joseph Watt wrote that HB 1449 "clearly levies a tax in the strict sense of the word and the incurred revenue from it is not incidental to its purpose."²¹ It is estimated that the EV fee/tax would have only created an estimated \$500,000 to \$1 million per year. Previously, the courts had found a similar tax on cigarettes was unconstitutional.

More information:

²¹ <https://newsok.com/article/5569264/court-strikes-down-another-oklahoma-fee>

Sierra Club v. State of Oklahoma (OK Tax Commission)

<http://www.oscn.net/applications/oscn/deliverdocument.asp?citeid=481629>

Mississippi & Utah - New EV Fees in 2018

As of February 2019, twenty states have active registration fees specifically for electric vehicles. Two states, Mississippi and Utah, enacted new fees for EVs during 2018. The number of states with fees for electric vehicles continues to increase. It appears that the trend may continue. Some state legislatures proposed lowering or removing EVs over the past year although none of those bills were successful.

In Utah, S.B. 136 establishes a tiered system with registration fees for EVs that increases over time. The regulations establish that all-electric BEVs have a \$60 registration fee in 2019 that increases to \$90 in 2020, and \$120 thereafter. Plug-in Hybrid EV fees will be \$26 in 2019, \$39 in 2020, and \$52 starting in 2021. And hybrid vehicles will be subject to fees of \$10 in 2019, \$15 in 2020, and \$20 in 2021 and beyond. The Transportation Governance Amendments S.B. 136 bill generally addresses issues related to the governance of public transit districts.

In Mississippi, the state Legislature passed the Mississippi Infrastructure Modernization Act (MIMA) during a special session in August 2018. MIMA is designed to create permanent and growing fund for infrastructure in cities and counties across the state. The bill created a new fee for electric vehicles and hybrids; EVs owners will pay \$150 per year and hybrid owners will pay \$75 per year starting in 2021. This revenue will be sent to the Department of Revenue to be distributed in the same manner as gasoline taxes. Additionally, this new legislation has directed or diverted funds from various sources to transportation and infrastructure projects. Specifically, MIMA diverts 35 percent of the state's use tax on online sales to the state's local bridge replacement program. The legislation also directs state revenue from sports betting at Mississippi casinos to transportation infrastructure projects. And the MIMA issues \$250 million in revenue bonds for the Emergency Road and Bridge Repair Fund administered by the Mississippi Department of Transportation. During the special session, the Mississippi legislature also passed the BP Oil Spill Bill with over \$100 million in settlement funds available for 128 specific infrastructure projects including several road and bridge projects.

Other Resources

Many entities and state legislatures across the United States have been examining options, projecting revenues, and identifying various challenges or opportunities to address the issue of declining state and federal gas tax revenue.

Iowa 2018 Report on the Impact of Electric Vehicles to the Road Use Tax Fund

The Iowa Department of Transportation published a *Report on the Impact of Electric Vehicles to the Road Use Tax Fund* as required by a bill (House File 2256) signed by the Governor in April 2018. The report explores a range of estimated impacts and explores possible mitigation strategies to address expected revenue losses. The mitigation strategies are evaluated on many factors including equity, ease of implementation, applicability to out-of-state drivers, and implications for commercial trucks. As of September 2018, there were approximately 1,900 BEVs in Iowa. The report acknowledges that there is little data available regarding the current driving habits of EV owners. In Iowa, the DOT estimates that a total of 3,000 EVs would result in lost fuel tax revenues of approximately \$317,000 in 2018.

Access report at:

<http://publications.iowa.gov/29142/1/EV%20RUTF%20Impact%20Report%20123118.pdf>

TRENDS Model from TxDOT and TTI

The Texas Department of Transportation partnered with the Texas A&M Transportation Institute to develop a model and tool that can forecast revenues and expenses for TxDOT from 2017 through 2050. The TRENDS Model was designed for planners, policy makers, and the public. The model's outputs include tables and graphs showing forecast of revenues, expenditures, and fund balances each year during the analysis period. It was created for regular updates with monthly cash forecasts, letting schedules from TxDOT, and other variables (like population forecasts, fuel efficiency, and inflation rates).

Access model at: <https://trends-tti.tamu.edu/>



IV. Appendix A. Calculations for Electric Vehicle Impacts on Transportation Revenue

Table 2: Estimate of Current Lost Gas Tax Compared to EV Registration Fee Revenue

Percent Evs registered by year	2011		2012		2013		2014		2015		2016		2017		2018- Jan/Feb 2019	
	2%		7%		12%		12%		9%		14%		18%		26%	
Body Style	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost gas tax	Average MPG	Lost Gas Tax
2 door sedan	30.2	\$ 2,052	36	\$ 5,567	36.8	\$ 9,951	37.8	\$ 9,747	39.2	\$ 6,864	41.1	\$ 10,404	43.6	\$ 12,573	45.2	\$ 17,623
4 door sedan	30.2	\$ 13,874	31.2	\$ 43,435	31.8	\$ 77,871	32.5	\$ 76,658	33.6	\$ 54,151	35	\$ 82,615	37	\$ 100,186	38.3	\$ 140,645
bus																
convertible	30.2	\$ 31	31.2	\$ 98	31.8	\$ 176	32.5	\$ 173	33.6	\$ 122	35	\$ 187	37	\$ 227	38.3	\$ 318
coupe	30.2	\$ 391	31.2	\$ 1,224	31.8	\$ 2,195	32.5	\$ 2,161	39.2	\$ 1,308	41.1	\$ 1,983	43.6	\$ 2,396	45.2	\$ 3,359
low speed vehicle	40	\$ 7,228	40	\$ 23,376	40	\$ 42,715	40	\$ 42,975	40	\$ 31,385	40	\$ 49,877	40	\$ 63,942	40	\$ 92,918
motorcycle	30.2	\$ 80	36	\$ 216	36.8	\$ 386	37.8	\$ 378	39.2	\$ 266	41.1	\$ 404	43.6	\$ 488	45.2	\$ 684
moped	30.2	\$ 36	36	\$ 98	36.8	\$ 176	37.8	\$ 172	39.2	\$ 121	41.1	\$ 184	43.6	\$ 222	45.2	\$ 311
SUVs	24.3	\$ 2,154	25.3	\$ 6,691	26	\$ 11,897	26.5	\$ 11,744	27.4	\$ 8,295	28.6	\$ 12,629	29.1	\$ 15,912	29.6	\$ 22,732
station wagon	30.2	\$ 60	31.2	\$ 189	31.8	\$ 339	32.5	\$ 333	33.6	\$ 236	35	\$ 359	37	\$ 436	38.3	\$ 612
truck	24.3	\$ 216	23	\$ 738	23.5	\$ 1,320	24	\$ 1,300	25	\$ 912	26	\$ 1,393	26.2	\$ 1,772	26.4	\$ 2,556
<i>truck tractor*</i>																\$ 3,806
van	24.3	\$ 93	23	\$ 318	23.5	\$ 568	24	\$ 560	25	\$ 393	26	\$ 600	26.2	\$ 763	26.4	\$ 1,100
Sub-totals		\$26,215		\$81,950		\$147,593		\$146,202		\$104,052		\$160,635		\$198,917		\$286,665
Grand Total Lost Gas Tax		\$1,152,229														
Lost Gas Tax Per Vehicle		\$ 99														
EV Registration Revenue		\$1,513,850														
Surplus from Evs		\$ 361,621														

*<https://www.bts.gov/content/combination-truck-fuel-consumption-and-travel>

Table 3: Projected 2025 Lost Gas Taxes compared to EV Registration Fee Revenue

Body Style	Estimated Vehicle Footprint	2025 MPG	80000 EV's Projected		40000 EV's Projected		20000 EV's Projected			
			# EV's	Lost Gas Tax	# EV's	Lost Gas Tax	# EV's	Lost Gas Tax		
2 door sedan	40	48.7	1,807	\$ 132,666	904	\$ 66,333	452	\$ 33,167		
4 door sedan	49	41.3	25,893	\$ 2,241,023	12,946	\$ 1,120,512	6,473	\$ 560,256		
convertible	49	41.3	1,165	\$ 100,819	582	\$ 50,409	291	\$ 25,205		
coupe	40	48.7	2,352	\$ 172,643	1,176	\$ 86,322	588	\$ 43,161		
low speed vehicle	40	48.7	939	\$ 68,898	470	\$ 34,486	235	\$ 17,243		
motorcycle	>40	48.7	1,755	\$ 128,850	878	\$ 64,425	439	\$ 32,212		
moped	>40	48.7	156	\$ 11,431	78	\$ 5,716	39	\$ 2,858		
SUVs	54	36.5	21,594	\$ 2,114,753	10,797	\$ 1,057,376	5,398	\$ 528,688		
station wagon	49	41.3	1,832	\$ 158,523	916	\$ 79,261	458	\$ 39,631		
truck	62	27.6	17,965	\$ 2,326,717	8,983	\$ 1,163,359	4,491	\$ 581,679		
<i>truck tractor</i>				\$ 7,886	66	\$ 188,006	33	\$ 94,003	16	\$ 188,006
van	62	27.6	4,476	\$ 579,738	2,238	\$ 289,869	1,119	\$ 144,934		
Total Gas Tax Lost					\$ 8,224,068		\$4,112,071		\$2,197,040	
Lost gas tax per vehicle					\$ 103		\$ 103		\$ 110	
Lost gas tax per vehicle (no tractor trucks)					\$ 100		\$ 100		\$ 100	
Revenue from EV registration fees					\$10,400,000		\$5,200,000		\$2,600,000	
Revenue surplus					\$ 2,175,932		\$1,087,929		\$ 402,960	

V. Appendix B. Registration Fees for EVs

State	BEV	PHEV	HEV	Notes	State Bill
CA	\$100 / year	\$100 / year	n/a	Fees enacted 7/1/2020. Applies to all ZEV, including FCEVs	SB1 (2017)
CO	\$50 / year	\$50 / year	n/a	Applies to all plug-in vehicles	HB1110 (2013)
GA	\$200 / year non-commercial \$300 / year commercial	\$20 / year <i>(For optional license plate purchase)</i>	n/a		HB170 (2015)
ID	\$140 / year	\$75 / year			HB312 (2015)
IN	\$150 / year	\$50 / year	\$50 / year		HB1002 (2017)
MI	\$135/year Under 8000 lbs \$235/year Over 8000 lbs	\$47.50 / year Under 8000 lbs \$117.50 / year Over 8000 lbs	n/a		HB4736 (2015)
MN	\$75 / year	n/a	n/a	Includes FCEVs	HF3 (2017)
MS	\$150 / year	\$75 / year	\$75 / year		HB 1 (2018)
MO	\$75 / year	\$37.50 / year	n/a	Additional fees apply to buses & non-passenger ZEVs	142.869 (2014), SB619 (1998)

NE	\$75 / year	\$75 / year	n/a	Fees apply to all alternative fuel vehicles	LB289 (2011)
NC	\$130 / year \$100 / year	\$130 / year \$100 / year	n/a	HB97 increased annual fee in 2015	HB97 (2015) SB402
OK	\$100 / year	\$30 / year	n/a	On Oct 24, 2017, State Supreme Court bill was ruled unconstitutional	HB1449 (2017)
OR	\$110 / year	\$110 / year	n/a		HB2017 (2017)
SC	\$120 / biennial	\$60 / biennial	\$60 / biennial	Includes FCEVs	HB3516 (2017)
TN	\$100 / year	n/a	n/a		HB534 (2017)
UT	\$60 / year (in 2019) \$90 / year (in 2020) \$120 / year (in 2021)	\$26 / year (in 2019) \$39 / year (in 2020) \$52 / year (in 2021)	\$10 / yr (19) \$15 / yr (20) \$20 / yr (21)	Beginning 1/1/2022, fees will be indexed to consumer price index.	SB136 (2018)
VA	\$64 / year	n/a	n/a	Includes all alternative fuel vehicles. If fees are not used for transportation, fee will fall to \$50/year.	SB127 (2014)
WA	\$100 / year Plus \$50 for vehicles with range over 30 miles	\$100 / year Plus \$50 for vehicles with range over 30 miles	n/a	Additional \$50 fee was added with 2015 bill.	HB5897 (2015) HB2660 (2012)
WV	\$200 / year	\$100 / year		Includes FCEV	SB1006 (2017)
WI	\$100 / year	\$70 / year	\$70 / yr		Act 59 (2017)

WY	\$50 / year <i>\$50 one-time fee</i>	\$50 / year <i>\$50 one-time fee</i>	n/a	In 2016, HB2 specified that EV decal must be paid & registered annually rather than a one-time fee	HB2 (2016) <i>HB9 (2015)</i>
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Note: Bills and details listed in italics represent previous bills and legislation that have been amended or superseded by more recent legislation.

Sources:

- National Conference of State Legislators, <http://www.ncsl.org/research/energy/new-fees-on-hybrid-and-electric-vehicles.aspx>
- NCCETC, The 50 States of Electric Vehicles, 2018 reports

VI. Appendix C. Mileage-Based User Fee (MBUF) Programs

The following tables outline current and completed pilot programs that examine new MBUF (VMT-based fee) alternative financing mechanisms. Table 4 outlines state programs and Table 5 outlines federal programs that explore regional or multi-state approaches.

Table 4: State MBUF Pilot Programs

State	Description	Study Documents
California	The Road Charge Pilot Program (RCPP) was a statewide demonstration pilot conducted from July 2016 until March 2017. The RCPP was conducted in response to SB 1077 (2014) which created a technical advisory committee to conduct the pilot and examine social equity, privacy rights, and transportation impacts of a statewide road charge program. Approximately 5,000 participants were included in the pilot.	Current information: https://californiaroadchargepilot.com Final report: http://www.dot.ca.gov/road_charge/resources/final-report/
Colorado	State agencies in Colorado completed a report on MBUF options in 2013. The primary conclusions were that an MBUF system can be created in Colorado. However, challenges were significant issues related to the technical, policy, and public acceptance perspectives.	https://www.codot.gov/programs/research/pdfs/2013/mbuf.pdf/view
Delaware	The first MBUF pilot on the East Coast was deployed by the I-95 Corridor Coalition and the Delaware DOT in 2018. During the pilot, 76% of participants used a plug-in device with location information and 8% used Android phone with location as their reporting device. Results of the pilot show that 65% of participants reported that they were more aware of how much they pay in fuel taxes, 90% said they would be willing to participate in another pilot, and reported privacy concerns decreased.	https://static1.squarespace.com/static/5a600479ccc5c5e5c8598516/t/5bf31dfb88251ba663238a39/1542659589041/I-95+MBUF+Phase+1+Pilot+Overview+9.21.18.pdf
I-95 Corridor Coalition	Along the I-95 corridor, a truck pilot program is currently underway to explore the feasibility of replacing the fuel tax with a MBUF in a multi-state environment. The pilot program began in October 2018 and will continue through mid-2019. As of early 2019, 59 trucks are participating. The program will gather information, concerns, recommendations, and experiences from various stakeholders.	Current information: https://www.i95coalitionmbuf.org/truck-pilot

Table 5: Projects Funded by Surface Transportation System Funding Alternative (STSFA) grants (FAST Act) - FHWA Federally Funded MBUF Pilot Programs

State Recipient	Project Description	Funding Year
California DOT (Caltrans)	Exploration of California’s Road Usage Charge Program (RUC) with emerging technologies and services, such as Usage-Based Insurance (UBI), Transportation Network Companies (TNCs), and Autonomous Vehicles (AVs).	FY2018
California DOT (Caltrans)	The project will explore mechanisms to collect revenue at pay-at-the-pump charging stations.	FY2017
California DOT (Caltrans)	Road User Charge (RUC) using pay-at-the pump/ charging stations.	FY2016
Colorado DOT	The project will investigate data collection mechanisms.	FY2017
Delaware DOT	User fees based with on-board mileage counters in collaboration with members of the I-95 Corridor Coalition.	FY2016
Delaware DOT with I-95 Corridor Coalition	Use of mileage-based user fees in a multi-state region. The project addresses the requirements for implementation, interoperability, public acceptance, and other potential hurdles across state lines.	FY2018
Delaware DOT with I-95 Corridor Coalition	The project will study equitability and privacy issues in a multi-state region.	FY2017
Hawaii DOT	User fee collection based on manual and automated odometer readings at inspection stations.	FY2016
Minnesota DOT	Demonstration of the feasibility of distance based user fees through the shared mobility model, such as Mobility-as-a-Service (MaaS) providers.	FY2018
Minnesota DOT	Use of Mobility-as-a-Service providers (MaaS) as the revenue collection mechanism.	FY2016
Missouri DOT	Deployment of innovative strategies such as a vehicle registration fee along with other used-based charges.	FY2018
Missouri DOT	The project will conduct public outreach on concerns related to equity and data security issues.	FY2017
Missouri DOT	Implementation of a new registration fee schedule based on estimated MPG	FY2016
New Hampshire DOT	Exploration of road user charges levied in conjunction with vehicle registration fees.	FY2018

Oregon DOT	The project will initiate improvements to Oregon’s existing road usage charge program.	FY2017
Oregon DOT	Improvements to Oregon’s existing road usage charge program.	FY2016
Oregon DOT	Establishing the consistency, compatibility and interoperability in road user charging for a regional system in collaboration with members of the Western Road User Charge Consortium.	FY2016
Oregon DOT with the Western Road User Charge Consortium (WRUCC)	Exploration of Road Usage Charge and Automated Vehicles at both the state level and in a regional interoperable system.	FY2018
Oregon DOT with the WRUCC	The project will launch a pilot between California and Oregon to connect the two states’ per-mile road user charging systems, to ultimately expand the concept regionally.	FY2017
Utah DOT	Utah will pilot a road user charge program for alternative fuel vehicles including hybrid and electric vehicles.	FY2016
Washington DOT	Testing critical elements of interoperable, multi-jurisdictional alternative user-based revenue systems. Piloting methods of road usage reporting.	FY2016
Washington DOT with Washington State Transportation Commission	The project will conduct public outreach with users regarding method for assessing and collecting fees.	FY2017

Sources:

<https://www.fhwa.dot.gov/pressroom/fhwa1902.cfm> (Feb 2019)

<https://www.fhwa.dot.gov/pressroom/fhwa1718.cfm> (Oct 2017)

<https://www.fhwa.dot.gov/pressroom/fhwa1648.cfm> (Aug 2016)

VII. Appendix D. Summary Alternative Fuel Excise Taxes & Fees

State	Alternative Fuel User Fee or Decal?	EV Fee?	Cents-Per-Gallon Excise Tax for Alternative Fuels?	Notes
AL				Taxed at motor fuel tax rate
AK			X	No dedicated funds within state
AZ	X			All fees deposited into state highway fund
AR	X		X	Funds classified as special revenue; 70% to "1991 Highway Construction & Maintenance Account"
CA	X	X	X	User can pay annual sticker fee or excise tax based on GGE or DGE
CO		X	X	Funds to Highways Users Tax Fund and EV Grant Fund for EVSE
CT			X	Funds to Special Transportation Fund
DE			X	CNG, LNG tax at \$0.22/gal; Funds to Transportation Trust Fund
FL			X	Natural gas flat rate tax implemented beginning Jan. 1, 2019; Funds deposited among multiple special transportation funds
GA		X	X	Taxed at motor fuel tax rate; fuels sold in bulk to licensed consumer distributor exempt
HI			X	Funds deposited to state treasury
ID		X	X	Taxed at motor fuel tax rate

IL			X	Taxed at motor fuel tax rate; additional 5.9 cent-per-gallon for LPG
IN	X	X	X	For “highway purposes” and distributed 53% to Indiana DOT and 47% to cities, towns, counties
IA			X	Funds to state transportation fund
KS	X		X	Propane users may choose permit decal rather than paying per gallon at pump
KY			X	Specific percentage distribution of funds to state road fund; set asides for secondary and rural roads, county roads/bridges, urban roads
LA	X		X	Decal program discontinued in 2016; funds credited to various highway and flood-control program
ME			X	Funds mostly to Highway Fund
MD			X	Funds to state transportation fund
MA			X	Funds to Commonwealth Transportation fund
MI		X	X	Deposited to State Treasury, credit to state transportation fund
MN		X	X	Excise tax funds to Highway User Tax Distribution Fund
MS	X	X	X	Funds to state roads fund
MO	X	X	X	Funds to Department of Transportation
MT			X	Excise tax for CNG and propane collected by fuel dealer
NE		X	X	Taxed at state motor fuels tax rate; funds to Highway Trust Fund
NV			X	Funds to State Highway Fund

NH			X	Funds to State Highway Fund, for paying off interest & principal of highway bonds
NJ			X	Funds to Motor fuel use tax distribution fund
NM	X		X	Funds primarily directed to transportation infrastructure
NY				Alt fuels exempt from motor fuel excise tax and state, local sales & use tax
NC		X	X	Taxed at state motor fuels tax rate
ND			X	Funds to highway tax distribution fund
OH			X	LNG taxed at state motor fuel tax rate
OK	X	X (not enacted)	X	Users can pay special excise tax or pay annual flat fee of \$150 for a decal
OR	X	X	X	Taxed at state motor fuels tax rate
PA			X	Taxed at state motor fuels tax rate
RI			X	Taxed at state motor fuels tax rate
SC		X	X	Taxed at state motor fuels tax rate
SD			X	Funds to motor fuel tax fund
TN		X	X	Funds to state transportation fund
TX	X		X	Excise tax for CNG & LNG; annual decal required for propane vehicles
UT		X	X	Funds to state transportation fund
VT			X	Natural gas is exempt from excise tax; sales and use tax is applied instead.
VA		X	X	Funds to commonwealth transportation fund

WA	X	X	X	Excise tax for CNG; annual fee for propane vehicle owners
WV		X	X	Electric and alt fuel vehicle fees apply to vehicles (\$200/ yr for hydrogen, electric, and natural gas); excise tax applies to fuels
WI		X	X	Funds to transportation fund
WY		X	X	Funds to state highway fund

Sources:

- DOE EERE, Alternative Fuels Data Center, <https://afdc.energy.gov/laws>
- American Road & Transportation Builders Association, *State Transportation Related Taxes and Fees on Alternative-Fuel & Electric Vehicles (2017)* https://transportationinvestment.org/wp-content/uploads/2018/01/Alt-Fuel-and-Electric-Vehicle-Taxes-and-Fees_12.19.17.pdf