

## Paying for the Roads: Electric Vehicle Road Usage and Registration Fees

The Federal government and the states fund highway construction and maintenance through taxes on gasoline and diesel fuel. Over the years, the revenue to pay for the roads has decreased in each state due to increasing labor and material costs through inflation, and the fact that gas taxes have not been indexed to inflation. In addition, vehicle mileage efficiency has improved significantly over the past decade, which provides a host of air quality and economic development benefits, but reduces the revenue from gas taxes. [In fact, average vehicle fuel efficiency increased](#) from 18.8 mpg in 1990 to at least 22.0 mpg in 2016 for all light-duty vehicles (SUVs and pick-up trucks included) on the road today, with new passenger cars able to achieve 36 mpg and new light-duty trucks able to achieve 26 mpg. Now, many states are experiencing a severe shortage in the revenue needed to maintain highways.

Battery electric vehicles (BEVs) do not pay any gas tax, but plug-in hybrid electric vehicles (PHEVs) do – and both still use the roads. In the long term, as these vehicles gain market share, they will need to contribute to the maintenance of roadways. However, at present they account for a miniscule portion of transportation funding shortfalls. For example, the transportation funding shortfall in Massachusetts is estimated at \$1 billion per year. The state has approximately 20,000 electric vehicles (EVs), including both BEVs and PHEVs.<sup>1</sup> Applying a registration fee of \$100 per year to each one (similar to what has been proposed in other states) would generate \$2 million per year, covering 0.2% of the funding shortfall. To impose a punitive registration fee, road usage charge or other penalty to BEV and PHEV drivers would hinder adoption of these clean vehicles, and do little to cover the funding shortfall.

### **What EVs Already Pay**

EVs do pay taxes that may support road construction and maintenance, as well as other taxes that support other goals. Since EVs generally cost more than their conventional counterparts, they pay higher sales taxes (in states with sales tax) and higher municipal excise taxes. An analysis by the Acadia Center showed that, in Massachusetts, these impacts result in EVs contributing more to state and local revenues than comparable gasoline vehicles.<sup>2</sup>

An EV that costs \$35,000 before rebates would pay about \$93 less per year in gas taxes than a comparable conventional sedan, but \$101 more in average annual excise tax over the vehicle's lifetime – as well as \$908 more in sales tax. If the EV is priced over \$60,000, then the EV pays far more in sales tax and excise tax.

Unlike gasoline vehicles, EVs run on electricity. Therefore, EV drivers pay taxes on the electricity used to charge the vehicles too. Many states and municipalities have taxes on electricity, either general sales taxes or special-purpose taxes. Punitive registration fees for BEVs would be a double tax, and for PHEV drivers this would be a triple tax.

### **Current EV Registration Fees**

The average fuel tax in the U.S. in 2018 was \$0.24 per gallon of gasoline, and \$0.26 per gallon of diesel fuel.<sup>3</sup> The average new light-duty car in the U.S. (most EVs are light-duty cars) had a fuel economy of 37.7 mpg in 2016.<sup>4</sup> At an average of

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<sup>1</sup> From <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/>, cumulative BEV and PEV sales were 17,859 through August 2018.

<sup>2</sup> "Electric Vehicles and State Funds," Acadia Center, March 2018. Online at <https://acadiacenter.org/wp-content/uploads/2018/03/Acadia-Center-EVs-and-MA-State-Funds.pdf>.

<sup>3</sup> Energy Information Administration, "Federal and State Motor Fuels Taxes" in *Petroleum Marketing Monthly*, August 2018. Online at <https://www.eia.gov/petroleum/marketing/monthly/xls/fueltaxes.xls>.

<sup>4</sup> Bureau of Transportation Statistics, *Average Fuel Efficiency of U.S. Light Duty Vehicles*. Online at <https://www.bts.gov/content/average-fuel-efficiency-us-light-duty-vehicles>.

11,112 miles per year,<sup>5</sup> a gasoline-powered car would use almost 300 gallons of gasoline per year and pay about \$71 in gas taxes.<sup>6</sup>

Currently, 20 states have EV registration fees, ranging from \$50 to \$200. In states that have higher gas taxes, the \$71 national average may not be the appropriate point of comparison. For example, California has an EV fee of \$100, but its gas tax system means that EV drivers are not in fact paying more than comparable conventional vehicle drivers. Furthermore, the California fee does not apply until MY2020, to allow for greater adoption of EVs throughout the state first. Still, the \$200 annual fee in Georgia and West Virginia is far above the annual gas tax paid by the driver of a new conventional vehicle.

New Hampshire has recognized that part of the funding shortfall in their state is indeed due to the improving fuel efficiency of new vehicles, and a proposed bill would remedy that by penalizing all efficient vehicles – including EVs. The proposed HB 478 (2019) would assess a registration fee on all vehicles based on their fuel economy, with the least efficient vehicles (20 miles per gallon or less) paying nothing and the most efficient (51 miles per gallon or more, or non-gasoline vehicles) paying \$111 per year. This would be independent of actual road usage.

### **Solutions**

Policymakers need to realize that until EVs reach a certain threshold of all light-duty vehicles on the road in a state, they shouldn't be incentivized on the one hand and punished on the other. Eventually, when a certain pre-determined threshold of EVs on the road has been met, EVs should pay a fair share of the wear and tear for using the roads. Instead of making EV drivers pay a punitive registration fee, it would be best to analyze and feasibly test other solutions that address the issue. To this end, Plug In America supports the eventual development of a road usage charge program.

Any road usage charge program should be kept simple and easy to understand. Distance and vehicle weight are likely the two most critical factors that contribute to road wear and the need to build new road. The criteria for determining the annual fees under a road usage charge program should be as follows: total electric miles driven, total gas miles driven and weight.

In terms of the vehicle miles driven (distance), more total electric miles driven should result in a lower overall fee compared to total gas miles driven. The final formula for the charge would therefore take into account the clean air quality benefits from PEVs. BEVs produce zero tailpipe emissions, and PHEVs produce less than their gasoline counterparts. The miles driven can easily be taken from the odometer on each vehicle, regardless if the vehicle is a BEV, PHEV or a gas vehicle. A road usage charge policy including these two criteria will fairly assess fees based on which citizens are using the roads the most, and reward those citizens who are also providing clean air benefits by driving PEVs.

It's important to note that the miles driven per vehicle is common question asked by insurance companies in determining the proper vehicle insurance rate on an annual basis. Plus, as telematics become a part of all vehicles, it will be easier for

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<sup>5</sup> Bureau of Transportation Statistics, *Average Annual Vehicle-Miles of Travel per Vehicle and Average Age*. Online at [https://www.bts.gov/archive/publications/bts\\_fact\\_sheets/oct\\_2015/table\\_02](https://www.bts.gov/archive/publications/bts_fact_sheets/oct_2015/table_02).

<sup>6</sup> Some states have additional fees on gasoline such as for cleanup of leaking underground storage tanks or for inspection and testing of gasoline infrastructure. These fees are not used for road funding, but are included in other groups' assessment of total fuel tax. Our calculations use only the actual fuel tax.

a state DMV to annually record the miles travelled per each vehicle. A similar advancement in technology happened within electric utility infrastructure – no longer do we see meter men writing down the electricity consumed every month, but instead smart meters that transmit that information directly to utilities.

The weight of any vehicle that exceeds 10,000 pounds is also an important criteria for a road usage charge formula. Vehicles above this weight limit are generally considered medium and heavy-duty vehicles, not light-duty passenger vehicles. The medium and heavy-duty vehicles, regardless if the vehicle is a PEV or not, will cause more road damage over time compared to lighter vehicles. There are "threshold effects," meaning that the damage to roads from vehicles is not a linear function of weight, but is much greater at higher weights.

A VMT-based fee provides a sustainable revenue source even if the transportation system changes to feature greater use of ride-sharing and car-sharing services. A funding mechanism based on vehicle registration fees would see diminishing revenue in such a case.

The precise levels of the road usage fees (by mile and by weight) can be adjusted as needed.

#### **Other Solutions: EV registration fee, per-kWh fees**

Compared to a road usage charge, an annual registration fee does not properly account for roadway usage. Furthermore, PHEVs may have most of their annual travel in electric mode, most in gasoline mode, or an even split. It is important to distinguish between those EVs that are basically functioning like BEVs and those that are basically functioning like internal combustion engine (ICE) vehicles. In addition, registration fees as a source of revenue may become unsustainable in a future with more car-sharing and ride-sharing programs.

A few states have explored a per-kWh fee for EV drivers. Since most charging occurs at home, a per-kWh fee on EV charging could require a separate meter for determining which electricity consumption was for the EV. This could be avoided through submetering, relying on the meters embedded in EVSE or the vehicles. A per-kWh fee is not as precise as a weight-based metric for assessing the impact of vehicles on the roads even though heavier vehicles will generally use more kWh per mile.

#### **Current Pilot Programs on a Road Usage Charge**

In February 2019, the [U.S. Department of Transportation providing funding to 7 states](#) to explore road usage programs. The states that were selected are CA, DE, MN, MO, NH, OR and UT. The National Conference of State Legislatures [tracks the states](#) that have introduced or passed legislation to study road usage charges and other VMT programs.

In addition, 14 states are participating in [Road Usage Charge West](#), a group that focuses on road usage charges and programs. The following states have either completed or are currently running road usage charge programs through Road Usage Charge West, or independently:

##### **Current Launched Programs:**

- Oregon: In 2001, the Oregon Legislature convened the Road User Fee Task Force to develop new ways to fund Oregon's roads and bridges. This Task Force examined the challenges and benefits of a mileage-based road user charge system and conducted two pilot projects to gather driver feedback on different options. The resulting program is [OReGO](#), a voluntary road user fee program that will likely eventually replace the state fuel tax. The first phase began in 2015 and is limited to 5,000 participants driving light-duty vehicles. The OreGo usage fee is 1.5 cents per mile.

**Pilot Programs:**

- California: California created a Technical Advisory Committee (TAC) in 2014 to study road usage fees and design a program that could replace the state gas tax. In 2016, the [California Road Charge Pilot](#) launched a 9-month long [pilot program](#) with 5,000 volunteer participants. The Road Charge Pilot Program confirmed the viability of many aspects of a user based transportation revenue mechanism, and tested the functionality, complexity, and feasibility of the critical elements of this potential revenue. In the future, Caltrans in collaboration with the Federal Highway Administration, will be investigating the feasibility of a pay-at-the pump option for a road charge system. While the mileage reporting methods tested in the Road Charge Pilot Program are all feasible, they cannot compete with the simplicity, cost effectiveness, and public acceptance of the current gas tax collection process. The [summary report](#) is here.
- Colorado: In 2011, the Mileage-Based User Fee (MBUF) study engaged the public in identifying strategies for MBUF programs. The Colorado Department of Transportation launched the [Colorado Road Usage Charge Pilot Program \(RUCPP\)](#) from December 2016 to April 2017 with 100 volunteer participants. The [pilot program](#) will provide insight on mileage reporting technologies, how well the technologies work with the Colorado environment, and the difference between urban and rural drivers. The pilot program simulated a 1.2 cents per mile charge. A [final report](#) was published in 2017. Privacy, cost of implementation and enforcement were areas identified that need further study.
- Hawaii: The Hawaii Department of Transportation and Hawaii Counties plan to test a statewide mileage based user fee program using funding from a [FHWA \\$3.98 million grant received in 2016](#). The [pilot project](#) will be conducted over 3 years in 6 different phases and involves the setup and implementation of an accounting system that provides prototypical invoices for mileage driven. This pilot program launched in the beginning of 2017.
- Washington: The Washington State Transportation Commission [recently completed](#) (Jan. 2019) the test-driving phase of their pilot program to test out a per-mile charge system at no cost to the drivers. Up to 2,000 volunteers provided feedback. The next step is for the information collected during the pilot to be compiled and analyzed over the coming months, and a comprehensive report of findings and recommendations to be submitted to the Governor, the State Legislature, and United State Department of Transportation (USDOT) in early 2020.
- Minnesota: In 2007, Minnesota obtained \$5 million for a [technology research project](#) to test a mileage-based road user fee using smartphones with GPS receivers and mileage-metering applications. The program was installed for 500 cars during three six-month test periods. Participants paid 1 cent per mile during off peak times and 3 cents per mile during peak times. This study was one of the first in the nation to test road usage charge best practices. [Some of the key findings](#) included understanding that privacy was not a huge concern to participants, learning about the types of planning, management and customer interaction needed, and learning that drivers valued simplicity of design of the road usage program.

**Research and Feasibility Studies:**

- Vermont: In January 2016 [a report by the Vermont Agency of Transportation](#) to the Vermont Legislature examined multiple options for raising the transportation revenue to the state due to the declining gas tax revenue. Options included a VMT program.
- I-95 Coalition: A coalition of east coast states that encompass the I-95 Highway conducted [a study](#) on mileage based user fee programs focusing on administrative aspects, institutional aspects, legal and legislative issues, and estimated costs. The second part of the research involved a further analysis of Maryland, Delaware, and

Pennsylvania, including a comprehensive cost analysis. As part of this coalition, several states, including Vermont, plan to launch a pilot program to test the technology and feasibility of implementing this program.

- New York: NYSEDA and NYDOT conducted a [study in 2012](#) that reviewed the potential for mileage based road usage fees as a replacement for the state fuel tax. The report concluded that there are significant, but not insurmountable, issues associated with a mileage based road usage fee. Some of these issues included the transition from a fuel tax to the mileage based road usage fee, privacy concerns, equity concerns, higher collection costs, and technical matters.
- Texas: In 2009, the University of Texas Transportation Institute released [a report](#) that collected and analyzed the different technology issues for a mileage based road usage fee, with a specific focus on the different architectures of a mileage based fee. The research concluded with recommendations and critical questions for Texas' policy and program development. [Another research study](#) performed in 2010 identified the challenge of public acceptance and the opportunities for potential applications of vehicle mileage fees. [Results show](#) that the mileage fee concept is viable, that driver privacy concerns can be addressed by limiting the type of data collected and how it's stored, and that mileage fees can be implemented with minimal cost to businesses.
- Nevada: In 2009, the Nevada Department of Transportation, the University of Nevada Reno and the University of Nevada Las Vegas conducted a [VMT fee research study](#) to assess and evaluate the feasibility of a vehicles miles traveled program. The research consisted of literature review, public outreach through meetings, workshops, newspaper editorials, newsletters, opinion surveys, videos, presentations.

New Zealand is currently the only country that has [fully switched to a road usage charge system based on vehicle miles travelled \(VMT\)](#), but only for drivers using diesel fuel. The program was established in 1978, and fees are paid on all diesel vehicles in the light, medium and heavy duty sectors and on all vehicles over 3.5 tons. The [road usage charge rates](#) are set according to vehicle types and weights, with the intention to encourage transportation operators to make efficient choices when transporting freight and other heavy items. [Electric vehicles are exempt](#) from this charge until June 30, 2020. Revenue collected from the program goes into the National Land Transport Fund, which is used for road construction and maintenance.

Other solutions include accounting for inflation costs within the gas tax, and pinning the gas tax to federal fuel economy standards.

#### Additional Resources

- [Sierra Club blog post on Road Usage Fees](#)
- [Mileage Based User Fee Alliance](#)
- [Road Usage Charge West](#)

#### About Plug In America

Plug In America is the nation's leading independent consumer voice for accelerating the use of plug-in electric vehicles in the United States to consumers, policymakers, auto manufacturers and others. Formed as a non-profit in 2008, Plug In America provides practical, objective information collected from our coalition of plug-in vehicle drivers, through public outreach and education, policy work and a range of technical advisory services. Our expertise represents the world's deepest pool of experience of driving and living with plug-in vehicles. The organization conceived National Drive Electric Week and has advanced workplace charging by pioneering ride-and-drive events at such leading corporations as Google, Mattel and Paramount Pictures. We drive electric. You can too. [www.pluginamerica.org](http://www.pluginamerica.org)