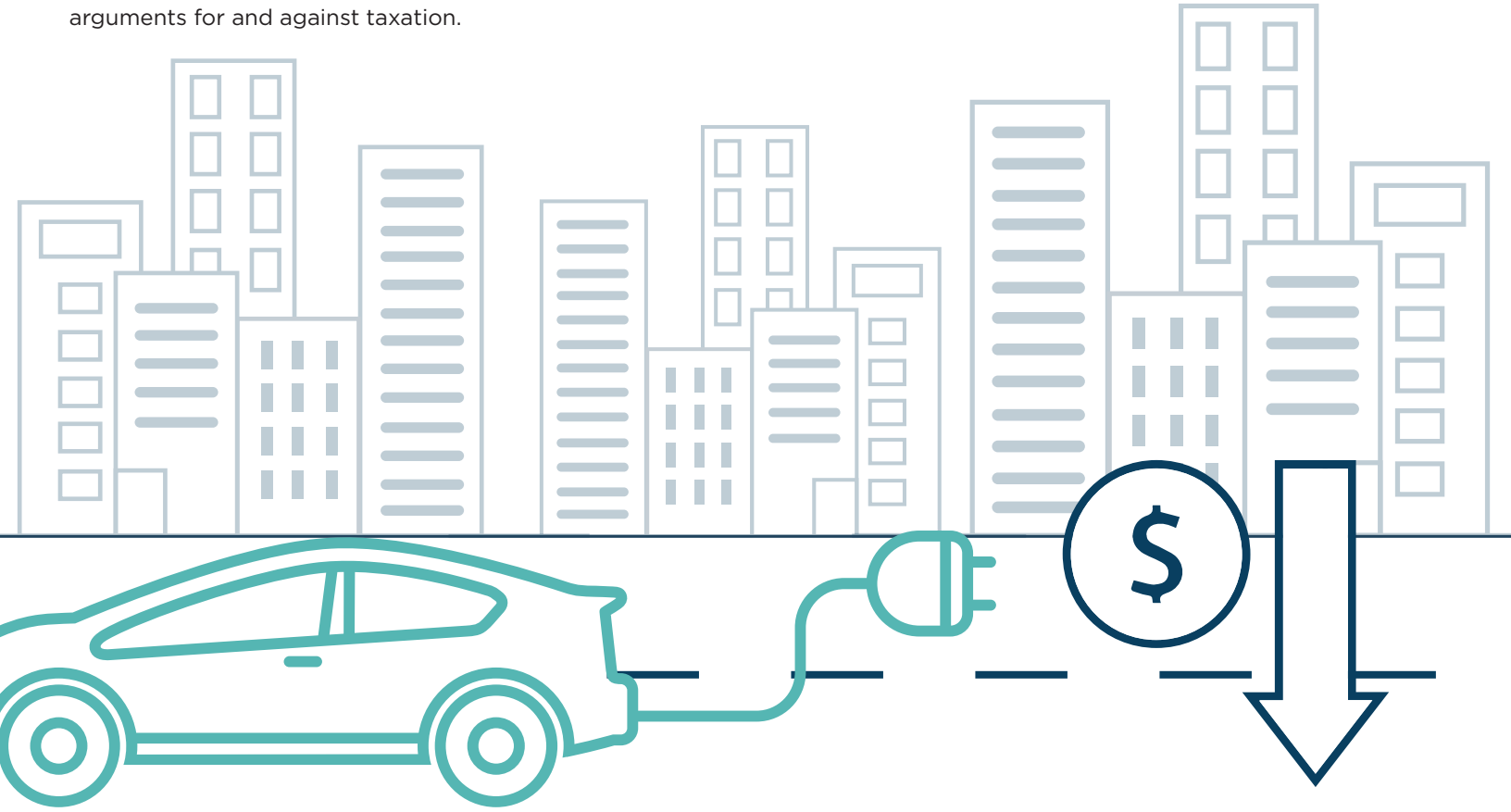
The NC FIRST Commission was created in March 2019 to evaluate North Carolina's transportation investment needs. Their job is to advise the Secretary of Transportation of new or better ways to ensure that critical financial resources are available in the future. As part of this process, we'll be looking for input from you, the people of North Carolina! This brief examines how increased sales of electric and hybrid vehicles will impact transportation revenues and explores revenue policy options.

Revenue Impact from Electric and Hybrid Vehicles

Overview

Executive Order 80, issued by Governor Roy Cooper on Oct. 29, 2018, directs how North Carolina can address climate change. Among other goals, because North Carolina's transportation sector contributed 32 precent of the state's total greenhouse gas emissions in 2017,[1] the order seeks to increase the number of zero emission vehicles (ZEVs) to at least 80,000 by 2025.

As of March 17, North Carolina has more than 13,482 electric vehicles and 158,081 hybrids. While EV owners pay an additional $130 vehicle registration fee, hybrid owners do not pay an additional fee. Based on Division of Motor Vehicle data, hybrid and electric vehicle owners pay approximately $50 less in state transportation taxes per year than gasoline vehicle owners. This brief explores the fiscal impact of electric and hybrid vehicles, alternatives to a registration fee, and the policy arguments for and against taxation.



[1] www.ncdot.gov/initiatives-policies/environmental/climate-change/Documents/nc-zev-plan.pdf

How will EVs and hybrids change the state's vehicle fleet?

With an average vehicle age of 12.7 years, it will take many years for EV and hybrid vehicles to create a significant change to the state's vehicle fleet. As shown in **Figure 1**, the number of hybrid vehicles in North Carolina has grown 251 percent in the last ten years but the growth has slowed in recent years. While the number of registered EVs grew 70 percent from FY 2018 to FY 2019, hybrid registrations increased 4.8 percent. Totaling 1.8 percent of existing vehicles (**see Figure 2**), the number of EV and hybrid vehicles will grow, but they are not expected to outpace gasoline vehicles in this decade.

NCDOT's ZEV plan[2] provides a guide to increasing the number of EVs, but barriers exist. The lack of adequate charging infrastructure, the cost of EVs, and short driving ranges currently impede EV sales, but these issues are rapidly diminishing. As shown in **Figure 3**, the NCDOT ZEV plan forecast includes three scenarios, ranging from a low of 264,850 EVs to a high of 346,377 by 2030. On a national level, IHS Markit predicts electric and hybrid vehicles will account for 7.6 percent of US vehicle sales by 2026, compared with only 1.2 percent in 2018.[3]

Figure 1: North Carolina EV and Hybrid Registrations[4]

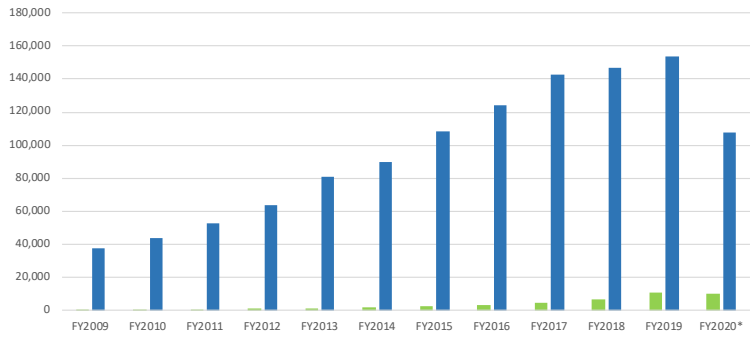


Figure 2: North Carolina's Existing Vehicle Fleet

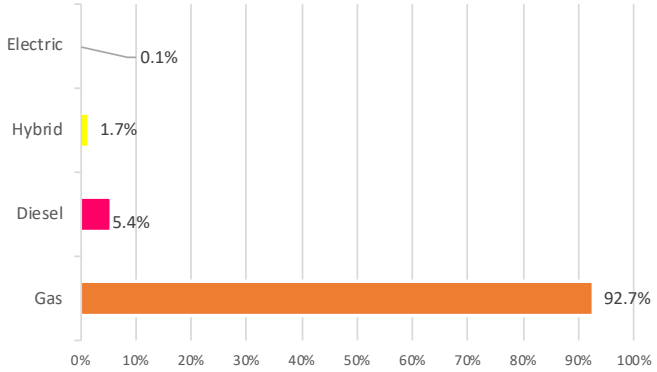
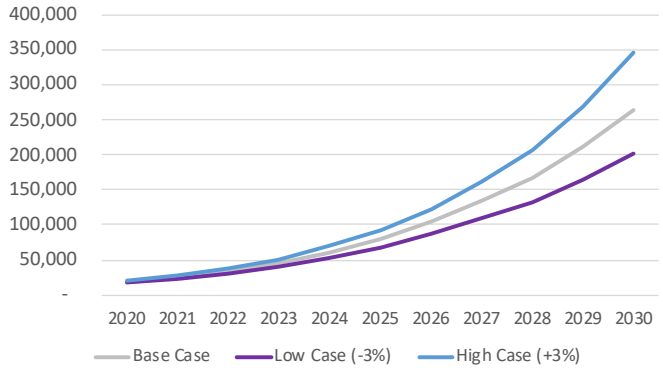


Figure 3: North Carolina Electric Vehicle Forecast[5]



[2] Ibid.

[3] www.reuters.com/article/us-autos-electric-forecast/outside-of-tesla-future-ev-sales-in-u-s-may-be-thin-for-most-brands-study-idUSKCN1SZ20I

[4] FY2020 data through March 16, 2020

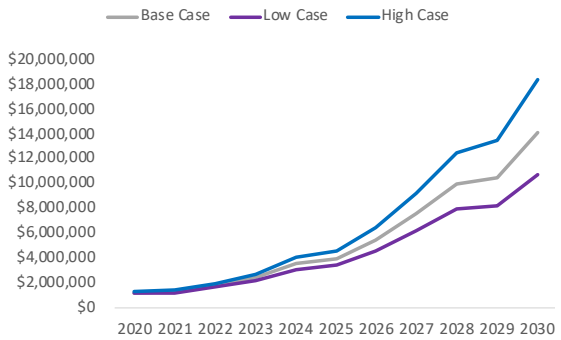
[5] Ibid.

Do EV and hybrid vehicle owners pay their "fair share"?

In general, North Carolina drivers contribute to state infrastructure investments through a combination of fuel taxes, DMV fees (such as driver license fees, vehicle titling fees, and vehicle registration and inspection fees), and highway use taxes on vehicle sales and long-term leases or rentals. Using DMV data to approximate the average total taxes and fees paid to support transportation services by vehicle type, EV owners currently pay approximately $50 less per year than gasoline vehicle owners.[6,7] Using the forecast from the NCDOT ZEV plan to estimate total revenue loss, electric vehicle ownership will result in a $10.7 million loss in the "low case" to a $18.4 million loss in the "high case" (**see Figure 4**).

Based on vehicle fleet data, the average hybrid vehicle operating in North Carolina has a fuel efficiency that is 17.6 more miles per gallon than the state's average vehicle. Exacerbating the difference, hybrid owners drive more miles annually than gasoline or EV owners. Assuming a 3 percent growth rate in the number of hybrid vehicles and increases in fuel efficiency, hybrid owners can expect to pay approximately $130 less per year than gasoline vehicle owners by 2030. This will lead to an annual revenue loss of $25-$28 million.

Figure 4: North Carolina Electric Vehicle Forecasted Revenue Lost[8]

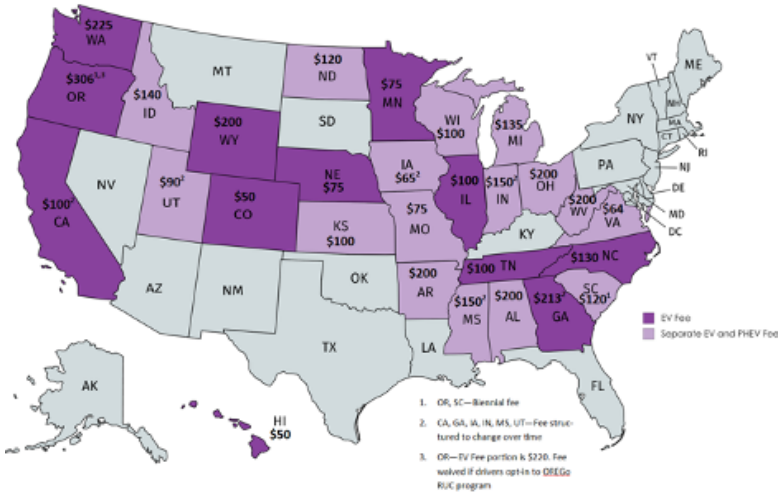


What are the alternatives for capturing revenues from EVs and hybrid vehicles?

Electric and hybrid vehicles present North Carolina and other states with a dilemma: how to maintain revenue equity for these vehicles (so all drivers pay their "fair share" toward the roads they use, even if they pay little or no motor fuel tax) while also encouraging their adoption for the sake of climate change, air quality, and other benefits. States are working to balance these concerns through a range of revenue options, each with its own considerations.

Electric and hybrid vehicle fees. More than half the states have enacted special fees or taxes on electric and alternative fuel vehicles. As shown in **Figure 5**, 28 states now have additional registration fees for electric vehicles. These fees range from $50 to $213 per year and several are indexed to inflation or otherwise structured to grow over time. At least 16 states also have fees for some or all hybrid vehicles.[9] As of 2020, North Carolina's annual electric vehicle fee is $130, and there is no additional fee for hybrids.

Figure 5: Annual EV Registration Fees by State as of March 2020[10]



[6] For more information on the average tax paid by vehicle type, see the NC FIRST Commission's Issue Brief: Edition 1: *The NC Motor Fuels Tax* at www.ncdot.gov/about-us/how-we-operate/finance-budget/nc-first/Pages/resources.aspx.

[7] In the 2015 budget, the legislature increased most DMV fees by 30 percent and authorized DMV to apply an inflationary increase to DMV fees every four years, beginning on July 1, 2020 (N.C. Gen. Stat. §20-4.02). The quadrennial adjustments will have a short-term effect of reducing the revenue disparity between gasoline and EV users, but this effect is expected be short-lived because the state motor fuels tax is itself annually adjusted based on inflation and population (N.C. Gen. Stat. §105-449.80).

[8] Data assumes flat annual vehicle miles traveled (VMT) of 12,000, a flat comparable miles per gallon of 22.7, and the forecasted rate changes for the motor fuels tax and for the electric vehicle fee.

[9] Information compiled from National Conference of State Legislatures; National Governors Association (NGA); Transportation Investment Advocacy Center (TIAC), American Road and Transportation Builders Association; and relevant state statutes.

[10] Many thanks to Matthew Rogotzke, NGA Center for Best Practices, for providing this updated map.

Special registration fees are a simple and enforceable way to make up lost revenues from electric and hybrid vehicles, but they have raised some concerns.[11] At this early stage of EV adoption, for example, the proceeds make a minimal contribution to overall transportation funding—but having to pay an extra fee each year may discourage people from buying these vehicles and so may be at cross-purposes with policy goals to increase their use. To address this, according to the National Governors Association, some states are waiting to enact additional fees until EVs reach a higher adoption rate.[12] Also, flat fees are insensitive to vehicle miles traveled and therefore are less "fair" than fuel taxes in terms of reflecting actual road usage. As a result, motorists who drive less end up subsidizing those who drive a lot. Further, annual fees disproportionately affect lower-income drivers because a lump sum can be harder for households to cover than fuel taxes or other revenue options that are spread over time.

Taxes on electricity for vehicle use. An alternative revenue option is to tax the electricity used to charge electric and plug-in hybrid vehicles. This approach, based on consumption, would most closely mirror the motor fuel tax; it would reflect road usage to a similar degree and could be collected incrementally. However, implementation presents a challenge, especially in how to accurately identify where, when, and how much an EV is being charged to determine the appropriate tax.

Currently, most states tax at least some alternative vehicle fuels, with a few—including Pennsylvania and Iowa—imposing per-kilowatt-hour taxes on electricity used to propel vehicles. Under Pennsylvania's law, which has been in place since 1997, all alternative fuels are taxed on a gallon-equivalent basis based on the energy content of the fuel and the current state gas tax.[13] Rates are re-calculated annually; for 2020, the tax on vehicle-charging electricity is $0.0172 per kilowatt-hour. Users are responsible for calculating their own electricity usage and for reporting and remitting the tax.[14] In 2019, Iowa enacted a $0.026 per-kilowatt-hour "electric fuel excise tax" that will become effective on July 1, 2023. Iowa's legislation also included new fees for electric and hybrid vehicles.[15]

Mileage-based user fees. In recent years, interest has grown in the potential of a user fee that is based on how many miles you drive rather than how much fuel you consume. Known as a mileage-based user fee or road usage charge, this option has the flexibility to be fuel-neutral by charging the same per-mile rate across vehicle types, or to be aligned with other policy goals by applying different per-mile rates.

In 2015, Oregon launched a voluntary road usage charge program that is now open to any passenger vehicle that gets more than 20 miles per gallon. The per-mile charge is indexed to the fuel tax so that they go up together; this year, the rate is 1.8 cents per mile for all vehicles. Volunteers receive an account credit for fuel taxes they've paid, and starting in 2020, participating owners of electric and certain high-efficiency vehicles will be exempt from paying higher vehicle registration fees.[16] In addition, as of this year, Utah has its own opt-in program that is solely for alternative fuel vehicles. Utah's program also exempts enrolled electric and hybrid vehicles from additional registration fees; instead, users are charged 1.5 cents per mile, up to a maximum of what they would otherwise have paid through the annual flat registration fee. The per-mile rate is indexed to inflation.[17]

Summary

As electric and hybrid vehicle manufacturers improve vehicle technologies and battery range, the purchase price will become more competitive with gasoline-powered vehicles. Once the public and private sector deliver adequate supporting infrastructure, the number of electric and hybrid vehicles sold is expected to increase sharply. While the legislature has adopted a registration fee on electric vehicles to offset the cost to maintain highways, other long-term revenue options, like a per-mile fee for both electric and hybrid vehicles, will be valuable to consider.

[11] For more about the considerations related to different revenue policy options for EVs, see www.nga.org/center/publications/eie/planning-for-state-transportation-revenue-in-a-coming-era-of-electric-vehicles/ and www.oregon.gov/ODOT/Programs/RUF/IP-Road%20Usage%20Evaluation%20Book%20WEB_4-26.pdf.
[12] www.nga.org/wp-content/uploads/2019/09/2019-09-15-NGA-White-Paper-Transportation-Electrification-States-Rev-Up.pdf
[13] Pa. Cons. Stat. Ann. tit. 75, §9002 and §9004
[14] www.revenue.pa.gov/GeneralTaxInformation/Tax%20Types%20and%20Information/MAFT/AltFuelsTax
[15] 2019 Iowa House File 767
[16] Or. Rev. Stat. §§319.883 et seq.
[17] Utah Code Ann. §§72-1-213 et seq.; Utah Administrative Code §R940-8