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WHITE PAPER

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# Planning for State Transportation Revenue in a Coming Era of Electric Vehicles

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### *Executive Summary*

States face a grave transportation funding situation: Revenues are not keeping pace with needs as vital infrastructure assets reach the end of their designed life cycle and populations grow and shift. The funding gap is significant. According to an estimate from the American Society of Civil Engineers, \$1.4 trillion in additional funding is required to meet the country's infrastructure needs by 2025, and that gap is growing. At current funding levels, the gap will rise to \$4.3 trillion by 2040.<sup>1</sup> Traditionally, states have relied on a variety of revenue sources for transportation funding under a "user pays, user benefits" principle that roughly approximates a "user fee" to at least some degree. These sources include vehicle registration fees, tolls and state and federal gas and diesel taxes, also known as "motor fuel taxes," which represent the largest portion of revenue, ranging from 29% to 60% of state revenue. Fees and tolls are often regularly adjusted, and 31 states have increased their motor fuel taxes in the past six years, but a combination of factors has diminished the value of motor fuel taxes over time. Such factors include the rising fuel efficiency of vehicles, a shifting federal-state cost share on infrastructure investments and inflation (for taxes that are not indexed, which includes the federal motor fuel taxes that has remained at the same price since 1993 and 33 state taxes). Across all levels of government, the proportion of user-fee funding for highways has fallen over time. In 1965, user revenue accounted nearly 75% of spending, as of 2012, it has fallen to under 50%.<sup>2</sup>

As states are facing these challenges, the transportation sector is moving toward greater electrification. This shift is occurring as the technology improves, consumer appeal increases and states and others support greater electric vehicle (EV) use stemming from benefits for: economic development, sustainability, cost savings, health outcomes, air quality, climate change and fuel security. The move also spans multiple fleets, including personal, private and government-owned light-duty, transit and medium- and heavy-duty vehicles.

The growing popularity of EVs is adding to states' concerns about transportation funding. Vehicle electrification will ultimately lessen a mainstay of traditional sources of funding for the transportation system: motor fuel taxes. However, EVs currently make up less than 1% of the nation's total fleet and only 2% of new sales across the United States. Even in states with the highest EV adoption — **California, Oregon and Washington** — EV sales make up less than 8% of all new vehicle sales. EVs are expected to grow in popularity, although estimates vary. The Edison Electric Institute (EEI) projects that EVs could account for 7% of the total light-duty fleet in the United States by 2030, or 18.7 million of the projected 259 million light-duty vehicles on the road.<sup>3</sup> Concern with this growth, while not yet a reality, coupled with concern about the larger

transportation funding shortfall, has prompted more than half of states to introduce an additional annual registration fee on EVs, ranging from \$50 to \$225 per year.

Many have raised concerns about the adoption of EV registration fees and question the role of EVs in the transportation funding crisis. A first-order concern is that EV registration fees do not currently make a significant contribution to the goal of supporting transportation revenue, and in fact, they may adversely affect the goal of advancing EV adoption, particularly because the fees are annually paid all at once, up front. A nationwide survey by the University of California Institute of Transportation Studies (UC ITS) found that even a \$100 annual EV registration fee reduced consumers' likelihood of purchasing a battery-powered EV by 11%; it reduced their likelihood of purchasing a plug-in hybrid by 18%.<sup>4</sup> Notably, in conversations with the Oregon Department of Transportation, officials suggested that their analysis of new vehicle sales found that consumers were insensitive to registration and title fee changes. A related problem is that annual, upfront registration fees disproportionately affect lower-income vehicle purchasers in contrast with motor fuel taxes, which are paid incrementally at the pump. Further, there are overarching concerns that any imposition of an EV fee will increase overall costs and therefore weaken adoption incentives and the implicit cost drivers that encourage higher fuel efficiency. Some states have balanced these concerns by developing plans to only adopt EV-specific fees when the share of EVs reach a certain level within the overall fleet.

A second area of concern is that some view the fee amounts adopted in some states as greater than the equivalent amount of taxes paid by similar gasoline-fueled vehicles. Thus, fees are seen as creating an inequitable approach to maintaining the road network. Consumer Reports has issued the most comprehensive version of such an analysis, in which the authors determined that of the 28 states that charge an extra registration fee for EVs, 11 have set the fee higher than the equivalent gasoline taxes that new car owners pay.<sup>5</sup> The issue of equivalency is complex, including which metrics should be used to determine the "equivalent" of gasoline taxes, because of the rising and varied nature of fuel efficiency between the average vehicle in the fleet compared with new vehicles, making it an issue that states must examine carefully. The Consumer Reports analysis set a metric for EV fees as "justifiable" if it provides the same highway funding revenue as the average new gasoline vehicle. Further complicating matters, the user-pay model embodied by motor fuel taxes does not provide for a simple one-to-one comparison. The added wear and tear on the transportation system attributable to each light-duty passenger vehicle is low because most roads are designed and built to withstand the significantly higher weight of freight vehicles. This is the case even for EVs, which are slightly heavier than other light-duty vehicles. In principle, each user

is expected to contribute to use the road, but the physical impact on the roadway is generally not proportionally considered.

These dynamics presents a dilemma for decision makers who want to advance policy goals to support transportation electrification and meet transportation funding needs. This dilemma is particularly pronounced in the 28 states that have an extra EV registration fee. Of those states, eight also have a goal for EV adoption, and they and others have EV tax incentives, outreach programs or other adoption efforts in place. At the state level, this dilemma plays out in executive and legislative branch priorities; the most pronounced example being state departments of transportation that may have a directive specifically on reducing emissions, while simultaneously maintaining existing systems and achieving longstanding transportation missions of service delivery and performance. The role of revenue sources directly drives and shapes many of these decisions. Governors can help meet these two distinct yet interconnected goals by considering the broad range of existing and emerging policy options available and by collaborating across state agencies and stakeholders to craft solutions.

The developments and concerns surrounding EVs have prompted a broader consideration of how states are approaching their transportation revenue needs, and the various incentives and disincentives that are associated with each potential revenue source. Efforts to explore alternative approaches have centered on how best to reflect the user-pays principle. These efforts are driving an examination of how states, including those that are debating to retain or adopt an EV fee, can dampen these areas of concern. Some measures that states are adopting or considering include:

- Increasing existing motor fuel tax rates.
- Indexing motor fuels to inflation.
- Implementing mileage-based user fees (MBUFs), also known as “road usage charges” (RUCs).
- Studying fuel-neutral fees, based on energy consumption.

This paper examines a variety of funding methods in an era of increased electrification of the transportation sector. In addition, it highlights best practices from across the country. As policymakers look to the 2020 legislative session and weigh decisions about current and future sources of transportation revenue, governors can consider these measures to help their state better plan for a robust, sustainable and equitable approach to transportation revenue. Such efforts help ensure that transportation revenue sources and the mechanisms implemented for collection align with broader state policy goals. This document is intended to help states develop a comprehensive approach for addressing long-term transportation infrastructure needs that avoids dampening EV sales while simultaneously encouraging EV adoption through other programs and incentives.

### ***Introduction***

In 2019, cross-agency teams from 40 states and territories participated in four regional workshops that the National Governors Association (NGA) hosted on transportation electrification. The findings of these regional workshops, published in the paper “Transportation Electrification: States Rev Up” emphasized the need for collaboration among state agencies to ensure diverse interests at the table.<sup>6</sup> The discussions held during these workshops included an examination of transportation funding and the fees imposed on EV. The findings led NGA to prepare this white paper to help states explore the topic further. This paper was later informed by an experts’ roundtable, hosted by NGA on Nov. 4, 2019, and follow-up discussions with experts.

### ***Background***

State transportation networks and the agencies that construct, operate and maintain them are facing pressures that require an increase in spending and investment. In 2017, state and local governments collectively spent an estimated \$240 billion on infrastructure operations and maintenance — nearly a 10% increase from the prior decade.<sup>7</sup> Critical pieces of state transportation systems that were built 30, 40 and 50 years ago are nearing the end of their designed life cycle.

Meanwhile, Americans are driving more than ever before, in both light-duty and heavy-duty vehicles. Collectively, vehicle-miles travelled in the United States have risen from 2.57 trillion miles in 1998 to 3.2 trillion miles in 2018.<sup>8</sup> This increase in mileage results in increased wear and tear on the 4.1 million miles of public highways and the nearly 615,000 bridges in the United States.<sup>9</sup>

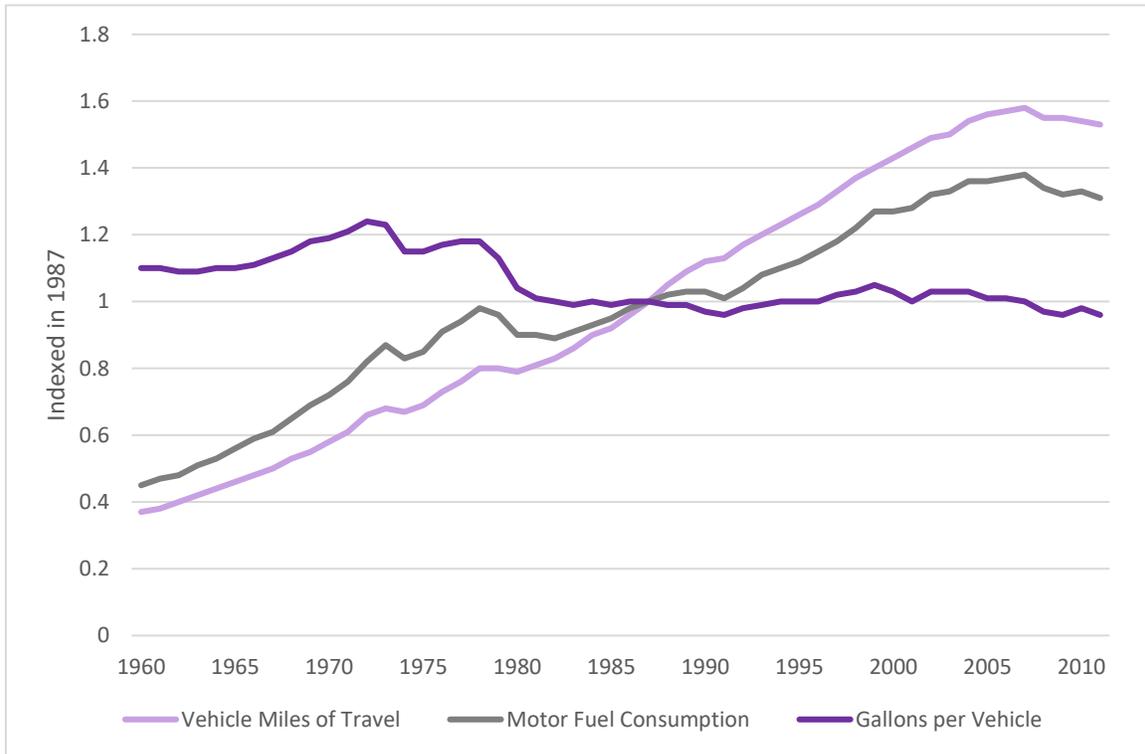
Importantly, since the completion of the interstate highway system, federal investment in transportation infrastructure has largely stagnated. In 1980, the federal-state share of spending on transportation and water infrastructure was 63% state and local spending and 37% federal. Today, state and local governments account for 78% of all infrastructure spending, and the federal government’s share has fallen to 22%.<sup>10</sup>

The portfolio of revenue sources for funding transportation infrastructure and operations varies from state to state, but the primary source for most states and territories is motor fuel taxes, which were first used by Oregon in 1919.<sup>11</sup> In 2016, 29% of state highway funding was raised through state motor fuel taxes. For some states, motor fuel taxes account for as much as 60% of highway funding; for at least 20 states, motor fuel taxes are the single largest source of revenue.<sup>12</sup>

However, most state motor fuels taxes have not been indexed to rise with inflation, weakening their purchasing power. Only 22 states have variable motor fuel taxes indexed to inflation, the consumer price index or other factors.<sup>13</sup> In addition, the federal motor fuel tax has remained at the same level — 18.4 cents per gallon for gasoline and 24.4 cents per gallon for diesel — since 1993, losing 73% of its value to inflation.<sup>14</sup>

In addition to inflation, the incremental rise in fuel efficiency of the vehicle fleet has affected revenue from motor fuel taxes. Since 2004, the average fuel economy for new vehicles has increased by 29%.<sup>15</sup> Vehicle miles traveled have increased, as well, but that increase has been more than offset by the combination of inflation and increased fuel efficiency, leading to a net decrease of 18% in federal motor fuel tax revenue and a 7% decrease at the state level between 1999 and 2013 (see Figure 1).<sup>16</sup>

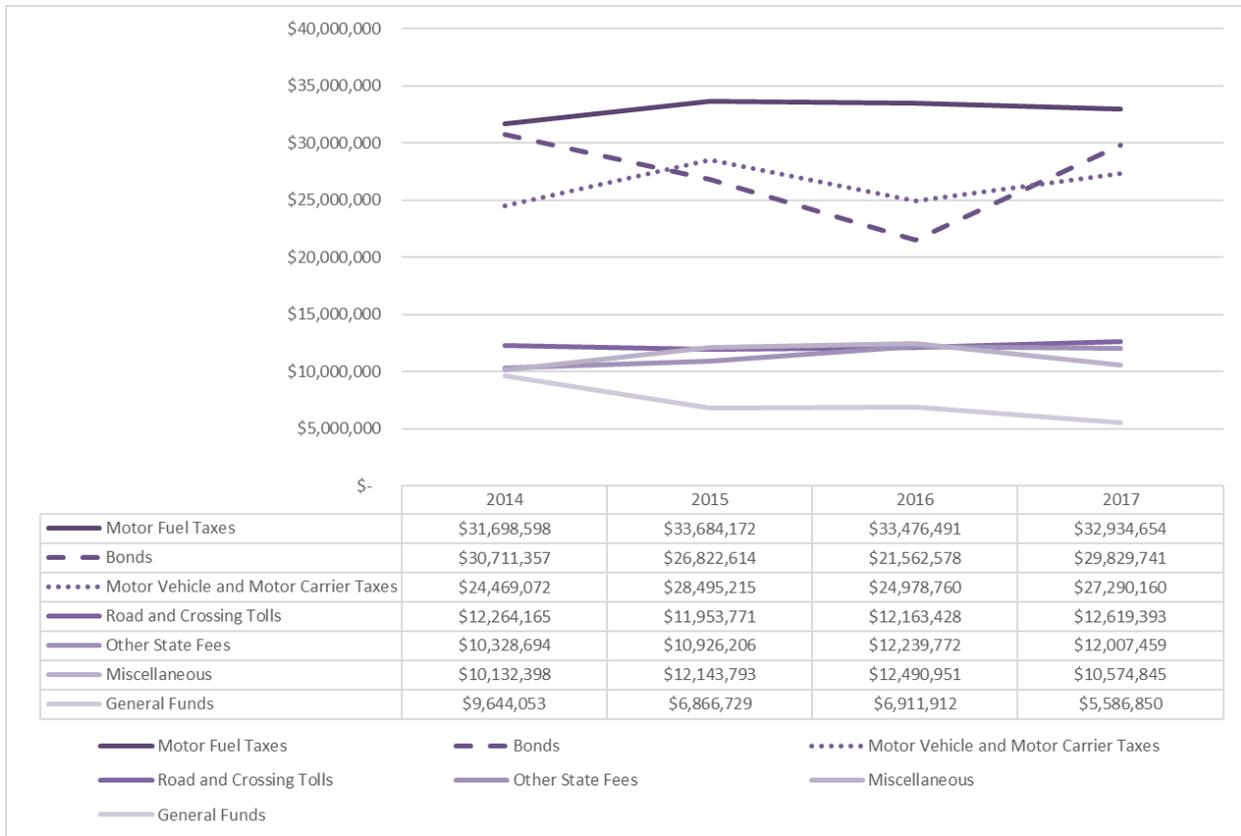
**Figure 1: Fuel Consumption and Vehicle-Miles Traveled as Indices: 1960-2011**



Source: Federal Highway Administration: Highway Statistics Series 2011.<sup>17</sup>

To supplement motor fuel taxes, states collect revenue from tolls, vehicle sales taxes, general sales taxes and vehicle registration fees (see Figure 2 and Table 1).

**Figure 2: State Revenues Used For Highways, 2014-2017 (Thousands of Dollars)**



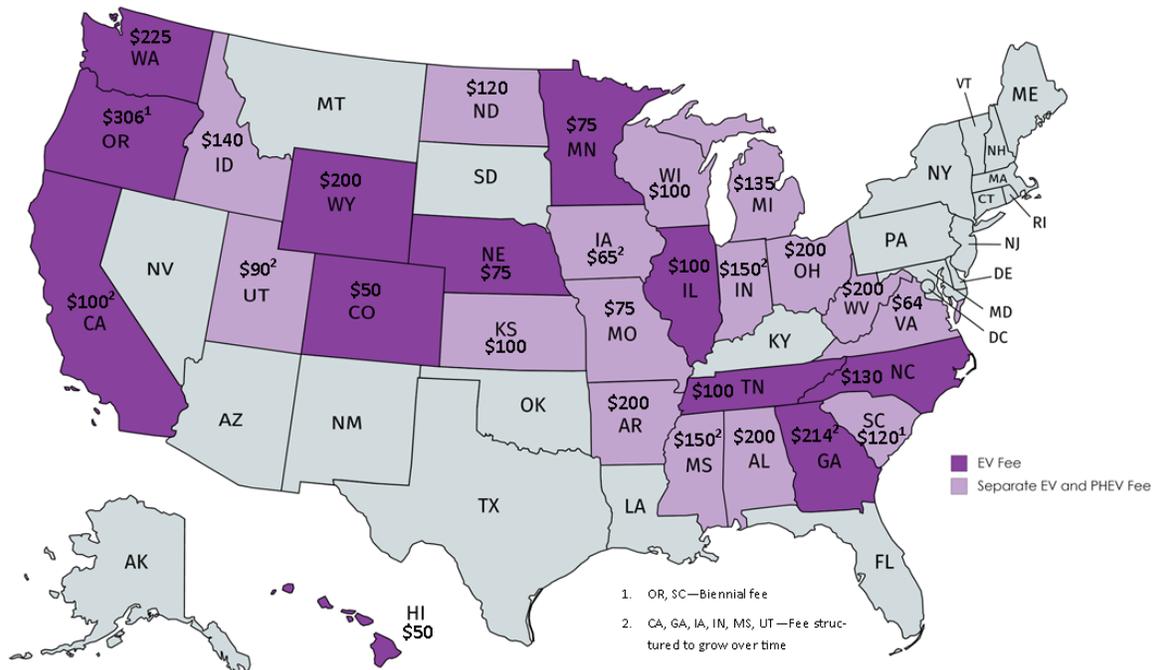
Source: Federal Highway Administration: Highway Statistics Series 2014-2017.<sup>18</sup>

**Table 1: Percentage of State Transportation Revenue Sources**

Year	Motor Fuel Taxes	Bonds	Motor Vehicle and Motor Carrier Taxes	Road and Crossing Tolls	Other State Fees	Miscellaneous	General Funds
2014	24.5%	23.8%	18.9%	9.5%	8.0%	7.8%	7.5%
2015	25.7%	20.5%	21.8%	9.1%	8.3%	9.3%	5.2%
2016	27.0%	17.4%	20.2%	9.8%	9.9%	10.1%	5.6%
2017	25.2%	22.8%	20.9%	9.6%	9.2%	8.1%	4.3%

As noted above, EVs comprise a marginal percentage of vehicles in all states. Yet, as EV sales have increased, several states have implemented additional registration fees for EVs as a means to raise new revenue or collect revenue that would otherwise have been collected through a gas tax. Consumer Reports conducted a comprehensive analysis in which the authors determined that of the 28 states that charge an extra registration fee for EV owners, 11 have set the fee higher than the equivalent gasoline taxes that new car owners pay.<sup>19</sup> The issue is complex, and agencies must decide which metrics governments should use to determine the “equivalent” of gasoline taxes based on the rising and varied nature of fuel efficiency between the average vehicle in the fleet and new vehicles (see Figure 3), while acknowledging that flat registration fees do not account for variance in usage or mileage.<sup>20</sup>

**Figure 3: Annual EV Registration Fees by State**



Between January 2011 to July 2019, only 677,000 battery-powered EVs were sold in the United States.<sup>21</sup> In comparison, 17.3 million total vehicles were sold in 2018 alone, adding to the total light-duty fleet of 259 million vehicles.<sup>22</sup> Projections for future EV sales vary and may largely depend on future policy decisions. According to a recent report from EEI and the Institute for Electric

Innovation, EVs could account for 7% of the total light-duty fleet in the United States by 2030 — 18.7 million of the projected 259 million light-duty vehicles.<sup>23</sup> Barring any unforeseen change in policy or technology, the current rate of adoption of EVs does not pose an immediate threat to transportation revenue through significant losses in motor fuel taxes, especially compared with the ongoing effects of inflation.

States are looking to spur vehicle electrification based on a variety of motivations, including the benefits of economic development, sustainability, cost savings, health outcomes, air quality, climate change and fuel security. Vehicle electrification can support emissions reductions and play a vital role in improving public health. A 2016 study estimated that the avoided health costs associated with EVs, from reduced emissions of fine particulate matter that can cause early death, cardiovascular issues, respiratory damages and other harms, amounts to nearly \$1,700 over the life cycle of each vehicle.<sup>24</sup> The emissions footprint of an EV depends on manufacturing practices, like all vehicles, and the electricity sources the vehicle uses, but overall an EV has less than half of the lifetime carbon emissions of the average internal combustion engine (ICE) vehicle, based on the emission profile of the electricity grid in 2016. Emissions associated with EVs would fall to less than 1/10th of an ICE vehicle if the electricity used to charge those vehicles came from 100% renewable or carbon-free energy, such as nuclear power.<sup>25</sup>

For individual drivers, there are motivations to purchase an EV beyond societal benefits. One key motivator for buyers is the appeal of lower maintenance and fuel costs over the lifespan of the vehicle. According to the U.S. Environmental Protection Agency (EPA), with the latest models of EVs, drivers can save up to \$1,000 per year in fuel costs and nearly \$1,500 in maintenance costs over the life of the vehicle.<sup>26</sup>

State governments have implemented EV fees largely based on the user-pay principle. Several aspects of the user-pay principle, however, have been misunderstood in these policy debates. For example, a recurrent view is that the slightly higher curb weight of light-duty battery-powered EVs inflicts a greater portion of wear and tear on the roads and that, under a strict application of the user-pay principle, drivers of EVs should pay more. Current EV models do have a heavier curb weight than their ICE counterparts, but the impact on the roadway is negligible because roads are built to high levels of performance. Indeed, the user-pay principle has historically not incorporated the proportional physical roadway impacts of heavier vehicles. For example, a single 18-wheeler with a fully loaded weight of 80,000 pounds produces physical road and bridge damage equivalent to 9,600 light-duty vehicles.<sup>27</sup> The external cost to build and maintain highway infrastructure that can accommodate freight travel is not proportional to the levied user fees.<sup>28</sup>

If EV fees are set at a level that significantly decreases the affordability of the vehicle or offsets the financial benefit that motivates its purchase, the fees can be counterproductive to states making efforts to reduce pollution and carbon emissions and increase electrification. A nationwide survey from UC ITS found that a \$100 annual registration fee reduced the likelihood of people purchasing a battery-powered EV by 11% and reduced people likelihood of purchasing a plug-in hybrid vehicle by 18%.<sup>29</sup> Registration fees, including extra fees for EVs, also have associated equity concerns stemming from the disproportionate impact imposed on low-income drivers and their lump-sum nature compared with the incremental approach of a motor fuel tax.

Importantly, increasing the affordability of EVs has been a key incentive strategy to increase adoption rates. Notably, 45 states have policies to further incentivize the sale of EVs through additional tax credits or rebates, high-occupancy vehicle lane exemptions, emission testing or inspection exemptions, parking incentives, utility rate reductions, alternative fuel technology loans and financial incentives for commercial fleets and charging infrastructure.<sup>30,31</sup> Participants at NGA’s roundtable noted that, compared to other financial incentive strategies, foregoing a fee could be one of the lowest-cost ways for states to encourage EV adoption.

### *Revenue Policy Levers, Impacts and Goals*

As governors head into the 2020 legislative session and beyond, they will likely encounter one or more transportation revenue policy options, each with many considerations. To address the dilemma of securing sufficient transportation revenue while supporting EV sales growth, an opportunity exists to examine best practices to date to enact new policies or improve existing revenue mechanisms. Some of the leading approaches governors can consider include a mix of tried-and-true and evolving mechanisms: motor fuel taxes, MBUFs, general registration fees, sales taxes, fuel-neutral fees or taxes and EV fees. Table 2 profiles these options, which are described in more detail below. Additional measures such as congestion pricing, carbon taxes, weight-based fees, and external-cost taxes are also being considered to varying degrees at federal, state and local levels.

**Table 2: Matrix of Transportation Revenue Policy Options**

	Motor Fuel Tax	Mileage-Based User Fees	General Registration Fees	Sales Tax	Fuel Neutral Fees or Taxes	Electric Vehicle Fees
<b>Usage and Mileage</b>	Accounts for usage and mileage.	Accounts for mileage.	Does not account for usage and mileage.	Does not account for usage and mileage.	Can account for usage, requires specific design to account for mileage.	Does not account for usage and mileage.
<b>Fuel Efficiency</b>	Encourages fuel efficiency.	Requires specific design to encourage fuel efficiency.	Requires specific design to encourage fuel efficiency.	Does not consider fuel efficiency.	Encourages fuel efficiency.	Requires specific design to encourage fuel efficiency.
<b>Cost Distribution</b>	Costs are spread over time.	Costs are spread over time.	Costs are upfront.	Costs are disassociated and spread over time.	Costs can be spread over time.	Costs are upfront.
<b>Policy Considerations</b>	Susceptible to inflation and long-term trends in fleet efficiency and electrification.	Majority of states have not studied how to enact an MBUF system.	Annual upfront fees affect the affordability of car ownership for lower-income households.	Obscures connection to transportation systems and competes with other policy objectives that rely on sales taxes.	EV charging fees require further testing to account for usage and avoid fare evasion.	Discourages EV adoption and requires additional design to support EV-specific infrastructure.

### Motor Fuel Taxes

Every state levies motor fuel taxes, but only 22 states have variable rate structures that adjust to keep pace with either inflation or the price of gas.<sup>32</sup> Since 2013, 31 states have raised their state motor fuel taxes. When set at an adequate level and given a variable structure to avoid the cumulative diminishing effects of inflation, motor fuel taxes are still a powerful source of transportation revenue that have the added benefit of encouraging vehicle fuel efficiency. There is also an array of innovative proposals to modernize the gas tax, including proposals to link the gas tax with EPA's mileage-per-gallon equivalency metric,<sup>33</sup> or to index motor fuel taxes to the average fuel economy, as used in used in some states.<sup>34</sup>

#### Considerations:

- Without being indexed to inflation or another variable metric, the purchasing power of motor fuel tax revenue will continue to diminish over time as vehicles continue to become more fuel efficient. The rise in EV sales poses long-term risks to motor fuel taxes as a leading revenue stream, but the projected adoption rates suggest that well-maintained motor fuel taxes will remain a viable and effective transportation revenue source for the next decade.

### Mileage-Based User Fees

As an alternative to the gas tax, several states have begun to study, test and implement an MBUF, also known as a RUC. MBUFs set a per-mile rate, with mileage reported through physical inspections of the vehicle's odometer or digitally through a device plugged into the car's OBD-II port. Notably, the federal government has encouraged the development of MBUF programs through the U.S. Department of Transportation's Surface Transportation System Funding Alternatives grant program.

The Oregon Department of Transportation's OReGO has become one of the most advanced pilots of an MBUF system. Established in 2015, OReGO operates on a volunteer basis, with a set rate of 1.7 cents per mile. The state legislature indexed the MBUF rate to the fuel tax rate so as fuel tax increases occur, the MBUF rate increases as well. Volunteers have a variety of mileage reporting options, including a choice between devices. Volunteers can use either a global positioning system (GPS)-equipped device and supporting app or a non-GPS OBD-II device. Volunteers receive a credit of state fuel tax as fuel is used to drive taxable miles. Starting in 2020, registered owners of vehicles that are rated at 40+ miles per gallon that are enrolled in the OReGO program can avoid paying the enhanced registration fee.

Starting in 2020, EV and hybrid vehicle drivers in Utah will have an option to pay a RUC in lieu of an increased annual fee.<sup>35</sup> Similar to Oregon's MBUF program, the Utah RUC will operate on a volunteer basis, but it will be available only for alternative-fuel vehicles. The mileage rate is initially set at 1.5 cents per mile and will annually adjust for inflation. Volunteers will have the option to use an OBD-II device, telematics, a smartphone app or manual odometer reporting.

On the East Coast, the I-95 Corridor Coalition is operating a multistate MBUF pilot to study both in-state mileage and out-of-state mileage reporting. The coalition has also begun studying a multistate truck pilot for interstate freight mileage. Currently, volunteers in the I-95 pilots are not paying a fee and are receiving simulated monthly bills.<sup>36</sup>

### Considerations:

- MBUFs present many benefits as an alternative or replacement for the gas tax. MBUFs offer policy flexibility and can be applied in a fuel-neutral manner. However, if applied without consideration for the vehicle’s fuel efficiency, there is a concern that MBUFs can also have a negative impact on the adoption of EVs and on the cost pressures that drive the overall efficiency of the total fleet.
- These approaches are relatively new, but there have been challenges, including concerns over privacy and higher administrative costs (compared with other revenue mechanisms):
  - OReGO has found that targeted messaging and communication efforts have alleviated some privacy concerns. OReGO has also implemented strict privacy policies for the data that the department and private partners collect. OReGO account managers must undergo and maintain certification and are contractually obligated to protect personally identifiable information.<sup>37</sup>
  - Higher administrative costs are expected to decline as these programs grow and a market develops to provide services to the public.
- Mileage does not occur in a vacuum. Related policy areas, such as land-use, affordable housing and the availability of other mobility options, can have a dramatic effect on the average mileage required for people to meet their basic needs.

### General Registration Fees

All states require that vehicles be registered and titled for residents in their state. Vehicle registration fees are typically levied annually or biennially. Charges range from \$15 to \$300, depending on the state and the age or value of the vehicle. Notably, vehicle registration fees vary widely from state to state, both in terms of the rate level and in the assessed vehicle metrics. As of 2019, every state has a vehicle registration fee; 12 states scale these fees by the weight of the vehicle, and 16 states adjust the fee based on the vehicle’s price or age.<sup>38</sup> On average, general vehicle registration fees account for nearly 22% of state transportation funding, and nine states collect at least 40% of their funding through registration fees.<sup>39</sup> Notably, the same inflation-related concerns that apply to motor fuel taxes affect nonvariable or indexed registration fees.

#### OTHER GENERAL FEES

*States have also levied a variety of one-time or reoccurring fees to offset costs of a particular service and provide additional revenue, including:*

- *Driver’s license fees.*
- *Insurance background check fees.*
- *Transportation network company fees.*

### Considerations:

- Because registration fees are typically levied only annually or biennially and are paid in a single lump sum, the unexpected expense can catch vehicle owners by surprise. According to the Federal Reserve, nearly 40% of Americans are unable to seamlessly cover an unexpected bill of \$400.<sup>40</sup> Overall, low-income households already spend a disproportionate share of their income on transportation. According to the U.S. Bureau of Labor Statistics, the average household spends 15% of its annual expenditures on transportation. However, households in the lowest segment spend upwards of 58% of their income on transportation-related expenses.<sup>41</sup> The annual lump-sum nature of registration fees also stands in sharp

contrast to the incremental nature of motor fuel taxes or the monthly billing options of MBUFs.

- Registration fees do not have the policy flexibility that MBUFs or motor vehicle taxes offer to serve as a tax on fuel consumption or vehicle usage.

### Sales Taxes

Several states raise a significant portion of their total transportation revenue from general sales taxes and taxes on individual items such as alcohol and tobacco. In 2018, voters in 34 states passed 58% of the proposed transportation-related ballot measures, approving over \$40 billion for a variety of projects.<sup>42</sup> This trend continued in 2019, with voters in 20 states passing over 100 transportation ballot measures, totaling \$8 billion in investments.<sup>43</sup> Of the 2019 ballot measures, there were 28 proposals related to sales taxes for transportation across state and local government, of those, 18 passed (seven new or increased taxes).

#### Considerations:

- Although an effective revenue-generating option, sales taxes have been criticized for having the effect of disassociating and obscuring the cost of the transportation system from the general public.<sup>44</sup>
- For states without a history of levying a sales tax for transportation, a new tax or adjustment of a current tax could place infrastructure in direct competition with other policy areas and programs that already rely on a sales tax for funding.
- Sales taxes on non-essential items can distribute the burden of transportation infrastructure that currently disproportionately falls on low-income people.

### Fuel-Neutral Fees or Taxes

Similar to experiments with MBUFs, policy makers are examining mechanisms to collect transportation revenue based on fuel consumption, either in addition to or regardless of mileage – creating a gas tax equivalent that is neutral to a vehicle’s fuel type. For these models, capturing the fuel consumption of fully electric and hybrid vehicles requires either tracking and setting a rate for the charging of those vehicles, or applying a generalized rate based on the vehicle model.

Utilities, researchers and policymakers have begun experimenting with the potential of levying fees on drivers of EVs through vehicle charging. Charging fees based on kilowatt-hours are analogous to the pay-at-the-pump nature of motor fuel taxes, but this concept is not without its complications. Precisely measuring where and when an EV is charging to determine the appropriate fee or tax requires a combination of submetering and on-vehicle technology. Today, some utilities are making inroads for this approach, offering EV owners specific overall energy rates, as well as discounts and special rates for off-peak charging.

Alternatively, rather than tracking the specific charging location, policymakers and researchers are also examining a vehicle model-based approach to fuel neutral fees or taxes. The EPA’s mileage-per-gallon equivalency (MPGe) metric provides a rate for vehicles that do not use liquid fuels, including fully electric vehicles, plug-in hybrids, and compressed natural gas vehicles, quantifying how many miles each vehicle could travel if “using a quantity of fuel with the same energy content as a gallon of gasoline.”<sup>45</sup> Utilizing the MPGe metric, a fuel neutral fee or tax would set a universal rate for all vehicles, fees or taxes would then be levied on an annual basis, or spread over time, for vehicles that are not paying at the pump.<sup>46</sup>

### Considerations:

- Charging-specific fees require further study and testing to accurately account for usage and avoid the risk of fare evasion. Most charging occurs at home for individuals with garages or driveways, and submetering would likely necessitate electrical infrastructure installation.
- Taxes and fees on publicly available charging infrastructure could discourage their use and hinder EV adoption efforts at a time when many states are experimenting with ways to increase user adoption.
- Levying fuel neutral fees or taxes based on the vehicle model's mileage-per-gallon or MPGe would require supportive policies and on-vehicle technology or manual mileage reporting similar to the MBUF approach in order to account for the actual usage and mileage of all vehicles.
- As with all fees and taxes, indexing for inflation would be necessary to prevent the purchasing power of any fuel-neutral fee or tax revenue from diminishing over time.

### Electric Vehicle Fees

As of 2019, 28 states have levied annual registration fees specifically for EVs. Although EV fees can be crafted to align with the “user-pay” principle of transportation funding, these fees can also place a disproportionate burden on drivers of EVs compared with drivers of ICE vehicles, conflict with broader state policy goals and weaken a nascent industry. In some cases, the introduction of EV fees, coinciding with the removal of EV purchasing incentives has been tied to considerable declines in EV sales.<sup>47</sup>

### Considerations:

- From an administrative cost perspective, EV registration fees are a relatively low-cost option as a revenue source. However, specifically how the fees are set and collected can have a tremendous impact on equity, affordability and adoption rates. For states that are considering imposing a new EV fee or looking to revise their existing fee structures, a few best practices have emerged. For example, using an equivalency metric for comparing EV efficiency with ICE vehicles can help set an equitable rate structure. Some states have also sought to dedicate a portion of the revenue from EV fees to the installation or construction of EV charging infrastructure. In **Alabama**, EV owners must pay an additional \$200 annual fee. However, 25% of the revenue collected will be dedicated to the state's Electric Transportation Infrastructure Grant Program to support the installation and construction of EV charging infrastructure.
- Applying a flexible collection method on EV fees can also help maintain their affordability. For fees that are at a relatively significant level, particularly in the \$100 or more range, allowing for monthly or quarterly payment options could help alleviate the financial impact of registration fees, which disproportionately affect low-income households.
- Some states have decided to postpone enacting any EV fees until these vehicles hit a more significant proportion of the market share or of the total fleet within the state, other states have decided to convene multi-agency commissions to conduct comprehensive studies of the various revenue options to plan for future scenarios.
- Without additional policy mechanisms, these fees are not connected to mileage driven. As such, those who drive an EV a low number of miles will pay more per mile than those who drive an EV further, creating a disparity between EV drivers and the amount paid for road usage.

### *Conclusion*

Meeting transportation revenue needs for investment, maintenance and operations is a pressing challenge for governors. This challenge is made more difficult by the diminishing purchasing power of motor fuel taxes, driven primarily by inflation and the rising fuel efficiency of the overall fleet. Despite these trends, the gradually increasing popularity of EVs has attracted the attention of policymakers as an opportunity to bolster transportation revenue. However, creating an equitable user-pay revenue stream from EVs is a complex matter and one that may not necessarily align with broader state goals.

While general vehicle registration fees have become a mainstay in the transportation revenue ecosystem, the nature of an annual flat fee can have a disproportionate impact on low-income drivers and weaken fuel efficiency incentives. Further, some of the registration fees levied specifically on owners of EVs to date have been enacted at levels significantly higher than the fees and taxes collected from owners of an average new vehicle. Overall, EV fees, especially those set at exceptionally high levels, can have a detrimental impact on EV adoption rates.

States that are currently examining this issue should consider how transportation revenue sources can align with broader state emission and long-term electrification goals by coordinating across related agencies, including transportation, energy and environmental protection, and by consulting with relevant stakeholders and advocates.

### Citations

- <sup>1</sup> American Society of Civil Engineers. (2016). Failure to act: Closing the infrastructure investment gap for America's economic future. Retrieved from <https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/ASCE-Failure-to-Act-2016-FINAL.pdf>
- <sup>2</sup> Dutzik, Tony and Weissman, Gideon. (2015). Who Pays for Roads? How the "Users Pay" Myth Gets in the Way of Solving America's Transportation Problem. Retrieved from <https://frontiergroup.org/sites/default/files/reports/Who%20Pays%20for%20Roads%20vUS.pdf>
- <sup>3</sup> Cooper, A., & Schefter, K. (2018, November). *Electric vehicle sales forecast and the charging infrastructure required through 2030*. Retrieved from [https://www.edisonfoundation.net/iei/publications/Documents/IEI\\_EEI%20EV%20Forecast%20Report\\_Nov2018.pdf](https://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20EV%20Forecast%20Report_Nov2018.pdf)
- <sup>4</sup> Jenn, A. (2018, December). Assessing alternatives to California's electric vehicle registration fee. Retrieved from <https://escholarship.org/uc/item/62f72449>
- <sup>5</sup> Harto, C., & Baker-Branstetter, S. (2019, September). *Rising trend of punitive fees on electric vehicles won't dent state highway funding shortfalls but will hurt consumers*. Retrieved from <https://advocacy.consumerreports.org/wp-content/uploads/2019/09/Consumer-Reports-EV-Fee-analysis.pdf>
- <sup>6</sup> Rogotzke, M., Eucalitto, G., & Gander, S. (2019, September). Transportation electrification: States rev up. Retrieved from <https://www.nga.org/wp-content/uploads/2019/09/2019-09-15-NGA-White-Paper-Transportation-Electrification-States-Rev-Up.pdf>
- <sup>7</sup> Congressional Budget Office. (2018, October). *Public spending on transportation and water infrastructure, 1956 to 2017*. Retrieved from <https://www.cbo.gov/system/files/2018-10/54539-Infrastructure.pdf>
- <sup>8</sup> U.S. Department of Transportation Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. (2019). Travel monitoring: Traffic volume trends. Retrieved from [https://www.fhwa.dot.gov/policyinformation/travel\\_monitoring/tvt.cfm](https://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm)
- <sup>9</sup> American Road & Transportation Builders Association. (2017, September). Highways policy. Retrieved from <https://www.artba.org/government-affairs/policy-statements/highways-policy>
- <sup>10</sup> Congressional Budget Office. (2018, October). *Public spending on transportation and water infrastructure, 1956 to 2017*. Retrieved from <https://www.cbo.gov/system/files/2018-10/54539-Infrastructure.pdf>
- <sup>11</sup> Oregon Department of Transportation. (n.d.). Fuels tax. Retrieved from <https://www.oregon.gov/ODOT/FTG/Pages/About-Us.aspx>
- <sup>12</sup> U.S. Department of Transportation Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. (2018, June 29). Highway statistics 2016: Revenues used by states for highways - 2016 1/. Retrieved from <https://www.fhwa.dot.gov/policyinformation/statistics/2016/sf1.cfm>
- <sup>13</sup> National Conference of State Legislatures. (2019, April 11). Variable rate gas taxes. Retrieved from <http://www.ncsl.org/research/transportation/variable-rate-gas-taxes.aspx>
- <sup>14</sup> Congressional Budget Office. (2019). Increase excise taxes on motor fuels and index for inflation. Retrieved from <https://www.cbo.gov/budget-options/2018/54817>
- <sup>15</sup> U.S. Environmental Protection Agency. (2019, March). *The 2018 EPA automotive trends report: Greenhouse gas emissions, fuel economy, and technology since 1975* (Report No. EPA-420-S-19-001). Retrieved from <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100W3WO.pdf>
- <sup>16</sup> Vock, D. C. (2015, May 18). States, not just feds, struggle to keep gas tax revenue flowing. *Governing*. Retrieved from <https://www.governing.com/topics/transportation-infrastructure/gov-gas-tax-revenue-states-inflation.html>
- <sup>17</sup> U.S. Department of Transportation Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. (2014, November 7). Highway statistics series. Vehicle registrations, fuel consumption, and vehicle miles of travel as indices: 1960-2011. Retrieved from <https://www.fhwa.dot.gov/policyinformation/statistics/2011/rc1c.cfm>
- <sup>18</sup> U.S. Department of Transportation Federal Highway Administration, Policy and Governmental Affairs, Office of Highway Policy Information. (2014, November 7). Highway statistics 2014: Revenues used by states for highways - 2014 1/. Retrieved from <https://www.fhwa.dot.gov/policyinformation/statistics/2014/sf1.cfm>
- <sup>19</sup> Harto, C., & Baker-Branstetter, S. (2019, September). *Rising trend of punitive fees on electric vehicles won't dent state highway funding shortfalls but will hurt consumers*. Retrieved from <https://advocacy.consumerreports.org/wp-content/uploads/2019/09/Consumer-Reports-EV-Fee-analysis.pdf>

- <sup>20</sup> Harto, C., & Baker-Branstetter, S. (2019, September). *Rising trend of punitive fees on electric vehicles won't dent state highway funding shortfalls but will hurt consumers*. Retrieved from <https://advocacy.consumerreports.org/wp-content/uploads/2019/09/Consumer-Reports-EV-Fee-analysis.pdf>
- <sup>21</sup> Auto Alliance. (n.d.). Advanced technology vehicle sales dashboard. Retrieved from <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard>
- <sup>22</sup> U.S. Department of Transportation Bureau of Transportation Statistics. (2019). "U.S. automobile and truck fleets by use. Retrieved from <https://www.bts.gov/content/us-automobile-and-truck-fleets-use>
- <sup>23</sup> Cooper, A., & Schefter, K. (2018, November). *Electric vehicle sales forecast and the charging infrastructure required through 2030*. Retrieved from [https://www.edisonfoundation.net/iei/publications/Documents/IEI\\_EEI%20EV%20Forecast%20Report\\_Nov2018.pdf](https://www.edisonfoundation.net/iei/publications/Documents/IEI_EEI%20EV%20Forecast%20Report_Nov2018.pdf)
- <sup>24</sup> Malmgren, I. (2016). Quantifying the societal benefits of electric vehicles. *World Electric Vehicle Journal*, 8(4), 996–1007.
- <sup>25</sup> Cornell, R. (2019). The climate change mitigation potential of electric vehicles as a function of renewable energy. *International Journal of Climate Change: Impacts and Responses* 11(1), 15–24. <https://doi.org/10.18848/1835-7156/CGP/v11i01/15-24>
- <sup>26</sup> Malmgren, I. (2016). Quantifying the societal benefits of electric vehicles. *World Electric Vehicle Journal*, 8(4), 996–1007.
- <sup>27</sup> Eschwege, H. (1979, July 23). *Truck weight and its effect on highways*. Retrieved from <https://www.gao.gov/assets/100/99181.pdf>
- <sup>28</sup> Austin, D. (2015, March). *Pricing freight transport to account for external costs* (Working Paper No. 2015-03). Retrieved from [https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/workingpaper/50049-Freight\\_Transport\\_Working\\_Paper-2.pdf](https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/workingpaper/50049-Freight_Transport_Working_Paper-2.pdf)
- <sup>29</sup> Jenn, A. (2018, December). Assessing alternatives to California's electric vehicle registration fee. Retrieved from <https://escholarship.org/uc/item/62f72449>
- <sup>30</sup> U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. (n.d.). Electric vehicles: Tax credits and other incentives. Retrieved from <https://www.energy.gov/eere/electricvehicles/electric-vehicles-tax-credits-and-other-incentives>
- <sup>31</sup> Hartman, K., & Dowd, E. (2017, September 26). State efforts to promote hybrid and electric vehicles. Retrieved from <http://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>
- <sup>32</sup> National Conference of State Legislatures. (2019, April 11). Variable rate gas taxes. Retrieved from <http://www.ncsl.org/research/transportation/variable-rate-gas-taxes.aspx>
- <sup>33</sup> Baumhefner, M. (2019, August 2). A simple way to fix the gas tax forever. Retrieved from <https://www.nrdc.org/experts/max-baumhefner/simple-way-fix-gas-tax-forever>
- <sup>34</sup> American Road & Transportation Builders Association. (2016, August). *The economic cost of allowing Georgia's inflation-based variable gas tax rate to sunset: More than \$33 billion in state economic activity at stake*. Retrieved from [https://www.artba.org/wp-content/uploads/2017/09/Georgia\\_Report\\_August\\_2016\\_Final.pdf](https://www.artba.org/wp-content/uploads/2017/09/Georgia_Report_August_2016_Final.pdf)
- <sup>35</sup> Utah Department of Transportation. (2019, August 26). Road usage charge. Retrieved from <https://www.udot.utah.gov/main/f?p=100:pg:0:::1:T,V:5090>
- <sup>36</sup> I-95 Corridor Coalition. (n.d.). *Mileage-based user fee pilot*. Retrieved from [https://static1.squarespace.com/static/5a600479ccc5c5e5c8598516/t/5d13b2b404c48b0001add45f/1561572023279/I-95+MBUF\\_Phase+1+Pilot\\_Fact+Sheet.pdf](https://static1.squarespace.com/static/5a600479ccc5c5e5c8598516/t/5d13b2b404c48b0001add45f/1561572023279/I-95+MBUF_Phase+1+Pilot_Fact+Sheet.pdf)
- <sup>37</sup> OReGO. (n.d.). Frequently asked questions. Retrieved from <http://www.myorego.org/frequently-asked-questions>
- <sup>38</sup> Compare.com. (2019, March 15). Vehicle title, tax & registration costs by state. Retrieved from <https://www.compare.com/auto-insurance/coverage/vehicle-costs>
- <sup>39</sup> Harto, C., & Baker-Branstetter, S. (2019, September). *Rising trend of punitive fees on electric vehicles won't dent state highway funding shortfalls but will hurt consumers*. Retrieved from <https://advocacy.consumerreports.org/wp-content/uploads/2019/09/Consumer-Reports-EV-Fee-analysis.pdf>
- <sup>40</sup> Board of Governors of the Federal Reserve System. (2019, May). *Report on the economic well-being of U.S. households in 2018*. Retrieved from <https://www.federalreserve.gov/publications/files/2018-report-economic-well-being-us-households-201905.pdf>
- <sup>41</sup> U.S. Bureau of Labor Statistics. (2019, September 10). Consumer expenditures—2018. Retrieved from <https://www.bls.gov/news.release/cesan.nr0.htm>
- <sup>42</sup> Eno Center for Transportation. (2019, January). Eno Brief: Transportation at the Ballot Box 2018. Retrieved from <https://www.enotrans.org/transportation-at-the-ballot-box-2018/>

---

<sup>43</sup> Eno Center for Transportation. (2019, November 6). Rapid Response Webinar: Transportation at the Ballot Box 2019. Retrieved from <https://www.enotrans.org/event/rapid-response-webinar-transportation-at-the-ballot-box-2019/>

<sup>44</sup> Eno Center for Transportation. (2013, February 26). Virginia's transportation funding proposal and the user-pay concept. Retrieved from <https://www.enotrans.org/article/virginias-transportation-funding-proposal-user-pay-concept>

<sup>45</sup> U.S. Department of Energy. Electric Vehicles: Learn More About the Label. Retrieved from <https://www.fueleconomy.gov/feg/label/learn-more-electric-label.shtml>

<sup>46</sup> Baumhefner, M. (2019, August 2). A simple way to fix the gas tax forever. Retrieved from <https://www.nrdc.org/experts/max-baumhefner/simple-way-fix-gas-tax-forever>

<sup>47</sup> Auto Alliance. (n.d.). Advanced technology vehicle sales dashboard. Retrieved from <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard>