Revenue Recovery Assessment Framework and Tool

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BUILD AMERICA CENTER

INNOVATIVE FINANCING AND DELIVERY
OF TRANSPORTATION INFRASTRUCTURE

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1. Introduction

Alternative fuel vehicles (AFVs), particularly Electric vehicles (EVs) are becoming increasingly popular due to their numerous benefits, such as lower operating and maintenance costs and enhanced performance (USDOE, 2022). However, the rising adoption of EVs presents significant challenges for transportation agencies, policymakers, and legislators, primarily due to their impact on traditional transportation funding mechanisms. Fuel taxes, a longstanding primary source of revenue for road maintenance and construction, continue to be diminishing because EVs do not consume gasoline (NASEM, 2024). This revenue shortfall raises concerns about the adequacy of preparations for this technological shift, including the need for new infrastructure, operational adjustments, and financial and policy reforms (Dumortier, 2017).

To address the revenue shortfall caused by declining fuel tax collections, policymakers must develop a comprehensive fee mechanism as an alternative to the traditional fuel taxes. Research suggests that alternative funding strategies are crucial for maintaining transportation infrastructure financing as EV adoption increases. A key challenge is developing such fee recovery mechanisms to recover lost revenue while ensuring fairness across different vehicle classes. This research project aims to address the multifaceted challenges associated with the adoption of vehicles with alternative fuels and their impact on transportation revenue generated from fuel taxes. The study will comprehensively examine the current landscape of non-motor fuel tax based fee structures across various U.S. states, providing a thorough analysis of existing practices. The study aims to equip public agencies with the necessary insights and tools to assess the fee structures effectively, thereby supporting informed decision-making on effective EV fee strategies.

2. Objectives of the Research

The objectives of the proposed research are:

a) Identify and analyze the multifaceted challenges associated with user fees for transportation funding, specifically concerning AFVs, with a primary focus on EVs.
b) Conduct a thorough review of existing literature on fee structures for alternative fuel vehicles currently employed across various states. Document and compare the diverse EV fees and mechanisms either already implemented or under consideration in different U.S. states.
c) Analyze and compare alternative mechanisms for addressing revenue losses, providing recommendations for effective recovery strategies.
d) Present the framework for calculating revenue loss due to EV adoption growth and evaluate alternatives to recover the loss.
e) Develop an interactive spreadsheet tool for calculating EV fee revenues and visualizing the impact of different fee structures under varying levels of market penetration and for multiple vehicle classes (motorcycles, cars, buses, trucks).

3. Challenges Related to Alternative Fuels

Historically, and to this day, the primary source of transportation funding relies heavily on revenues derived from motor fuel taxes. Traditional highway funding relies heavily on motor fuel taxes, with state and local user based taxes comprising 31% of total U.S. highway revenues ($113.9B out of total $368.9B), and federal user based taxes contributing 13% as of 2022 ($47.4B out of total $368.9B) (BTS, 2024). This funding model was originally established with the fundamental assumption that gasoline and diesel would continue to represent the predominant energy source for road transportation, with refueling predominantly taking place at retail gas stations, simplifying the process of tax collection. However, the evolving landscape of fuels and advanced vehicle technologies has given rise to challenges related to diminishing revenue streams and equity concerns among vehicle classes. In the context of this research, an EV means a vehicle propelled by an electric motor powered by a battery or other electrical device incorporated into the vehicle and not by an internal combustion engine. A Hybrid Electric Vehicle (HEV) means a vehicle that draws propulsion energy from both an internal combustion engine and an energy storage device. A plug-in hybrid electric vehicle means a vehicle with a hybrid propulsion system that is propelled by a combination of electricity supplied through a rechargeable battery and an internal combustion engine. For this research, HEVs are referred to both hybrid electric vehicles and plug-in hybrid electric vehicles. These challenges, which are associated with alternative fuels and cutting-edge vehicle technologies, are listed below:

- Emerging technologies have led to improved fuel efficiency, thereby reducing income from fuel tax revenues.
- Rapid advancements in-vehicle technologies and fuel efficiency improvements make it difficult to predict long-term revenues and design effective tax policies.
- The growth of shared mobility and autonomous vehicles could further impact fuel tax revenues, adding complexity to infrastructure planning.
- Conflicting state and federal policies regarding EVs create inefficiencies and confusion, hindering the development of a unified tax and revenue strategy for EVs.
- Lower-income and rural communities may have limited access to alternative fuel technologies, potentially worsening social inequalities.
- Changes in consumer behavior, such as home-based EV charging, make it harder to track and tax energy used for vehicular transportation.
- Excessive taxes or fees on alternative fuel vehicles could discourage consumers from adopting them.
- EVs are generally heavier than their gasoline counterparts and this could lead to varying levels of damage to infrastructure.

4. Literature Review

The challenges facing motor fuel tax systems in the era of emerging vehicle technologies are becoming increasingly pronounced. As electric vehicles (EVs) and alternative fuel vehicles (AFVs) gain traction, governments face mounting pressure to address declining revenues from traditional fuel taxes. This transition necessitates a re-evaluation of taxation frameworks to ensure financial sustainability while encouraging technological adoption.

Vehicle fuel efficiency improvements driven by Corporate Average Fuel Economy (CAFE) regulations have already led to significant reductions in fuel tax revenue. Projections indicate a potential 21% national decline in fuel-tax-based revenue by 2025, compared to 2010 levels, with losses potentially reaching 31-37% when HEVs and other alternative fuel vehicles are factored in (Vasudevan and Nambisan, 2014). Geographic analyses underscore this trend, with states like Virginia facing an estimated 5-19% decline in statewide fuel tax revenue by 2025 compared to 2016, and rural areas projected to bear 28% higher fuel tax burdens than urban counterparts (Jia et al., 2019). Similarly, Iowa's Department of Transportation reported an initial loss of $317,000 in 2018, with revenue reductions expected to increase twenty-fold by 2025 under high EV growth scenarios.

In response to these challenges, states have implemented various taxation strategies to offset revenue losses. Supplementary registration fees for EVs have emerged as a common approach. For instance, Alabama proposed an incremental fee of $181 per EV, projected to generate $333,000 annually, while Pennsylvania introduced a range of surcharges from $80 to $320, effectively balancing lost gasoline tax revenue (Xu et al., 2020; Ricciuti, 2020). Mileage-based taxation systems have also gained traction. Oregon's OreGo initiative charges 1.8 cents per mile, while Utah applies a rate of 1.52 cents per mile, capped at a predetermined flat fee. Additionally, Pennsylvania imposed an electricity tax of $0.0172 per kWh for EV charging, alongside taxation on alternative fuel vehicles equivalent to conventional gasoline rates. Research has shown that a $0.021/kWh electric fuel tax could achieve revenue parity with the federal gasoline tax of $0.184 per gallon (Short & Crownover, 2021).

Research further highlights the fiscal implications of widespread EV adoption. Short and Crownover (2021) projected a cumulative $4.3 billion revenue impact on the U.S. Highway Trust Fund between 2020-2029. Forecasts by Chamberlin et al. (2016) suggest a 29% decline in fuel tax revenue by 2040, while Jenn et al. (2015) estimated annual revenue losses ranging from $200 million to $900 million by 2025, depending on EV adoption rates. Proposed solutions include percentage-based registration fees (0.6% of MSRP), mileage-based fees (2 cents per mile), and electricity consumption taxes (4.5 cents per kWh). Iowa's Department of Transportation has proposed additional mechanisms such as non-residential charging location excise taxes and hydrogen fuel excise taxes to mitigate revenue losses.

The rapid adoption of EVs poses unique challenges that require innovative policy solutions. While supplementary registration fees are commonly used, they may inadvertently hinder EV adoption

rates. Plug in America (2020) advocated for mileage-based fees, emphasizing their potential for equitable distribution across rural and urban populations. To address disparities, Harto and Baker-Branstetter (2019) developed a "maximum justifiable fee" framework, aiming to balance revenue recovery with fairness between EVs and conventional vehicles. As the transition to alternative fuel vehicles accelerates, balancing incentives with sustainable revenue models will remain a critical priority for policymakers.

Globally, approaches to EV adoption and revenue recovery reflect diverse priorities. Nations like Norway and England have implemented comprehensive financial incentives, focusing on purchase-related benefits. China has adopted a multifaceted strategy, offering registration fee exemptions, preferential parking policies, and complimentary charging equipment with EV purchases. New Zealand has emphasized infrastructure development, strategically deploying charging stations along major transportation corridors to support EV growth (Hauff et al., 2018; IEA, 2021; Macioszek, 2021).

5. Analysis of Motor Fuel Tax Revenues and VMT

The current study analyzed trends in motor fuel tax revenues and the vehicle miles traveled (VMT) across the 50 states and D.C. using data from the Federal Highway Administration (FHWA) Highway Statistics data for the years 2015 to 2022. This period encompasses significant shifts in travel behavior, including the impacts of the COVID-19 pandemic, which dramatically altered mobility patterns, fuel consumption, and state-level motor fuel tax revenues. In this study, fuel tax revenues refer to the revenue generated from gasoline taxes as well as special fuel taxes (also known as diesel taxes).

The appendices provide a detailed breakdown of transportation and vehicle-related data, offering insights into state-level trends over time. Motor-vehicle registrations are categorized by type, including motorcycles (Appendix 1A), light-duty vehicles (Appendix 1B), buses (Appendix 1C), and trucks (Appendix 1D), spanning the years 2015–2022. State tax data, including gas tax (Appendix 1E) and special fuel tax (Appendix 1F), are presented in cents per gallon to show taxation trends and their revenue implications. Annual vehicle miles traveled (Appendix 1G) are reported in millions, while the distribution of vehicle distance traveled across various vehicle types is captured in percentages (Appendix 1H). Fuel tax revenues collected (Appendix 1I) are expressed in thousands of dollars to reflect fiscal trends. The adoption of alternative fuel vehicles is highlighted through annual registrations of electric vehicles (Appendix 1J) and hybrid vehicles (Appendix 1K) from 2016–2022, alongside internal combustion engine vehicles (Appendix 1L), providing a comparative view of the evolving vehicle landscape. The data presented in the appendices is sourced from the FHWA (2022) and AFDC (2024).

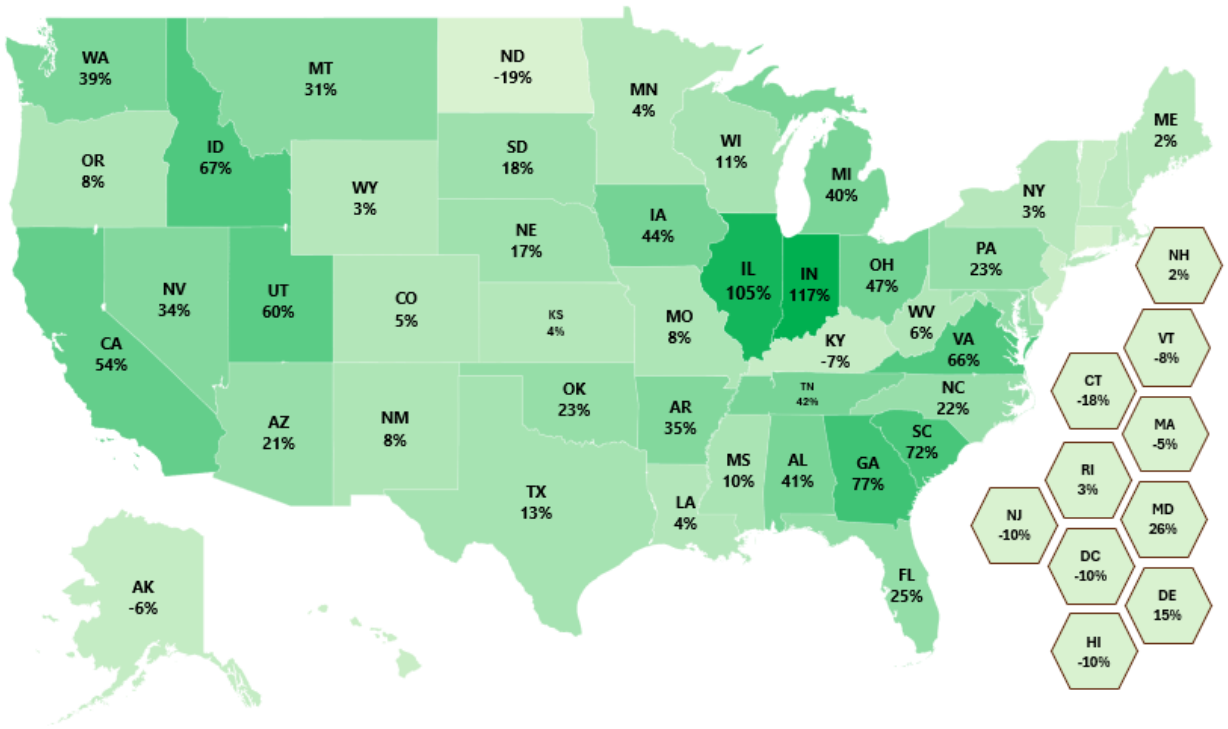

Figure 1: Percentage Change in State Fuel Tax Revenues 2015 vs 2022

In 2022, the collection of state fuel tax revenues nationwide varied significantly, reflecting differences in population, vehicle usage, and taxation rates. This data includes only the revenues from State taxes on all motor-vehicle fuels and related receipts in connection with motor-fuel taxation and administration, the federal taxes collected within the boundaries of each state are not considered in this computation. The revenues considered are on a nominal basis and not adjusted for inflation. California had the highest collection with over $8.4 billion, followed by Texas ($3.88 billion), Pennsylvania ($3.66 billion), and Florida ($3.05 billion). Alaska ($30 million) and Vermont ($113 million) reported the lowest collections. Ohio ($2.67 billion), Illinois ($2.49 billion), and North Carolina ($2.32 billion), also received substantial revenues, while Wyoming and North Dakota collected under $200 million. The full dataset is provided in Appendix 2A. These figures highlight the critical role fuel taxes play in state revenue, particularly for infrastructure funding.

Comparing the revenue collection between 2015 and 2022, notable fluctuations were observed across the U.S. states, with several states experiencing declines in fuel tax revenue (Figure 1). This reflects shifts in fuel consumption patterns, changes in travel patterns, or tax policies. North Dakota saw the largest decrease (-19%), followed by Connecticut (-17%) and New Jersey (-10%). Other states, including Hawaii (-10%), Washington, D.C. (-10%), Vermont (-7%), and Kentucky (-7%), also faced notable reductions. These trends highlight the continuing challenges in infrastructure funding as fuel efficiency improves, alternative fuel vehicles grow in popularity, and demographic or policy changes impact driving behaviors. Regarding the increase in fuel tax revenue, Indiana led with a remarkable growth (+117%), followed by Illinois (+105%), Georgia (+77%), and Idaho (+67%). Other states, including Virginia (+66%), Tennessee (+42%), and Ohio (+47%), also reported substantial gains. Most states, including California (+54%), Florida (+25%),

and Texas (+13%), recorded moderate-to-strong increases. The full dataset is provided in Appendix 2A.

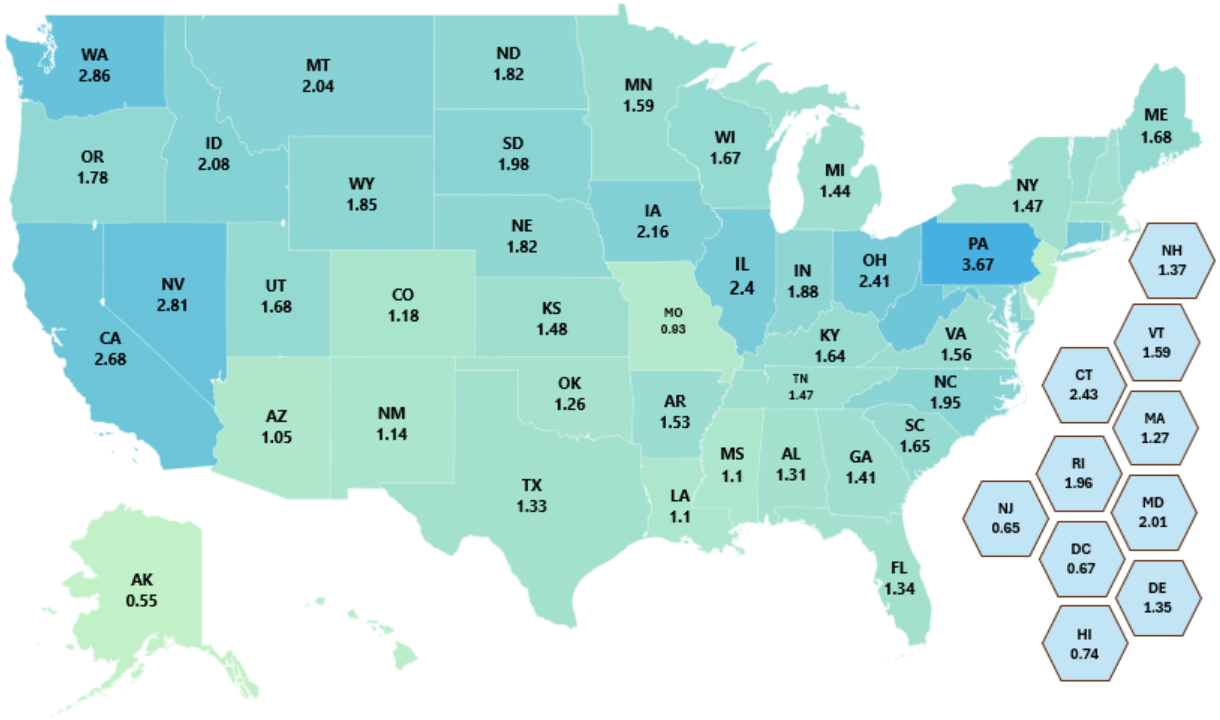

Figure 2 – State Fuel tax Revenue per VMT (in cents/vehicle-mile)

A deeper analysis is beneficial in examining state fuel tax revenue trends normalized by the vehicle miles traveled (VMT). Figure 2 illustrates the fuel tax revenue per mile, expressed in cents per vehicle-mile. This varied significantly across states in 2022, reflecting differences in fuel tax rates and driving patterns. Pennsylvania had the highest revenue at 3.67 cents per vehicle-mile, followed by Washington (2.86), Nevada (2.81), and California (2.68). States such as Illinois (2.40), Maryland (2.01), and Idaho (2.08) also reported high collection rates. In contrast, Alaska (0.55), New Jersey (0.65), and Washington, D.C. (0.67) had the lowest revenues per vehicle-mile, highlighting policy or fuel consumption differences. Most states, including Texas (1.33), Florida (1.34), and Georgia (1.41), collected between 1 and 2 cents per vehicle-mile, demonstrating a wide range in the revenue rates. The full dataset is provided in Appendix 2A.

Also, the percentage change in fuel tax revenue per VMT from 2015 to 2022 was assessed (Figure 3). Between 2015 and 2022, fuel tax revenue per vehicle mile traveled (VMT) experienced varying trends across states. Notable increases were observed in Illinois (+108%), Indiana (+79%), Virginia (+67%), Georgia (+63%), and California (+64%), reflecting significant growth in the revenue rate.

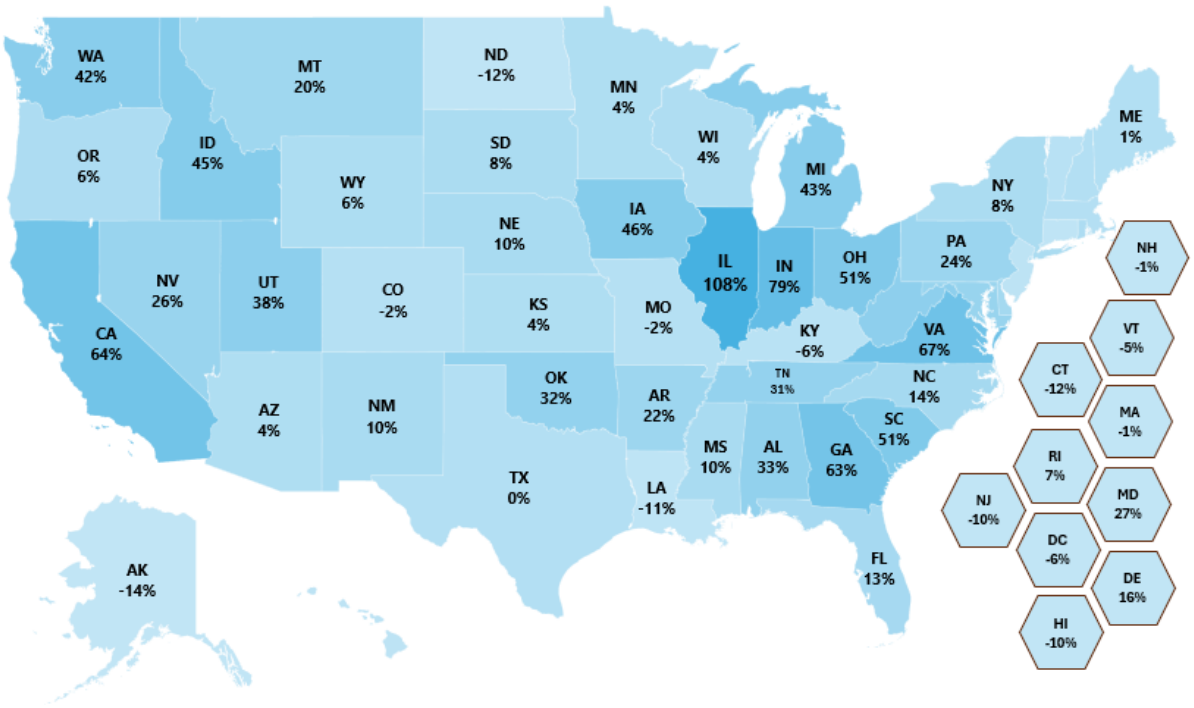

Figure 3: Percentage Change in State Fuel Tax Revenue per VMT 2015 vs 2022

Other states, such as Idaho (+45%), Ohio (+51%), and South Carolina (+51%), also showed substantial gains. However, several states faced declines, including Alaska (-14%), Connecticut (-12%), North Dakota (-12%), and Louisiana (-11%), indicating challenges in maintaining the level of fuel tax. A few states, like Texas, Massachusetts, and New Hampshire, saw no change, while others experienced minor shifts, underscoring the diverse dynamics of fuel tax revenue trends relative to VMT.

In summary, the analysis of fuel tax revenue trends from 2015 to 2022 reveals varied patterns across states regarding the absolute fuel tax revenue, fuel tax revenue per VMT, and percentage changes in these metrics. States like California, Illinois, Indiana, and Pennsylvania consistently stood out with high absolute revenues and significant growth in fuel tax revenue per VMT. Conversely, states such as Alaska, Connecticut, North Dakota, and New Jersey exhibited a decline in both absolute fuel tax revenues and fuel tax revenues per VMT, highlighting differences in the level of revenue collection per VMT. A few states, including Texas, Massachusetts, and New Hampshire, showed little to no change in fuel tax revenue per VMT, whereas others like Georgia and Idaho demonstrated a strong positive direction. These variations in absolute fuel tax revenue and fuel tax revenue per VMT indicate that states are not showing uniform trends across the metrics, reflecting differences in the impact of population, driving habits (VMT), taxation policies, and fuel efficiency.

6. The Concept of EV Recovery Fee

Transportation agencies are increasingly adopting revenue generation mechanisms that involve an annual supplemental EV fee to offset the loss in fuel tax revenue caused by the growing EV adoption. Often referred to as the "EV recovery fee," this approach offers a relatively simple and direct solution to address the shortfall in highway funding resulting from the decline in traditional fuel tax revenues (Konstantinou, et al., 2022). As depicted in Figure 1, the implementation of such a fee is seen as a compensatory mechanism designed to fill the financial gap caused by EV growth. Although this method is considered a practical interim solution to current transportation funding challenges, it also raises several policy-related concerns that complicate its broader application.

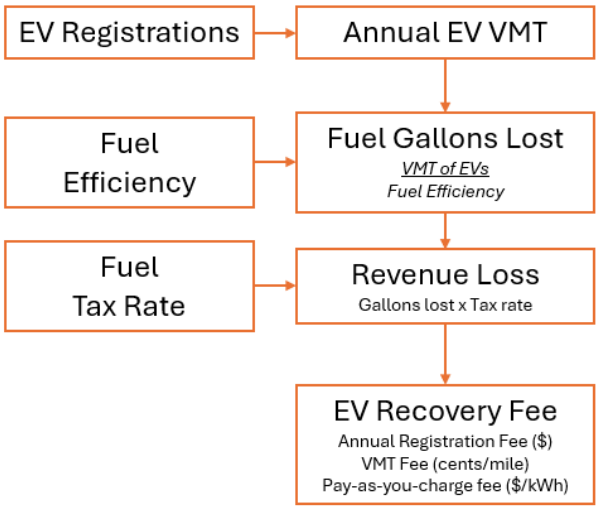

Figure 4: Methodology to calculate EV recovery fee (adapted from Konstantinou et.al, 2022)

The fiscal need for such a fee is clear. The introduction of a direct EV recovery fee offers an immediate means of generating additional revenue to compensate for the gap caused by reduced fuel tax revenues. By charging EV owners a fee based on their vehicle's usage or value, states can ensure that these vehicles contribute fairly to the cost of infrastructure maintenance and development, as in the case for gasoline-powered vehicles. However, the policy issues surrounding the introduction of EV fees are significant and complex. One of the primary concerns is that imposing additional fees on EVs may slow their market adoption. Many consumers are already hesitant about purchasing EVs due to the high upfront costs of EVs, and the introduction of an additional fee could act as a disincentive for purchasing EVs and it could be seen as counterproductive, as it may discourage consumers from adopting EVs.

These competing concerns highlight the challenge of balancing fiscal needs with the goal of broader EV adoption. On one hand, transportation agencies need to identify new revenue sources to maintain and improve infrastructure as traditional fuel tax revenues decline. On the other hand, they must ensure that the financial burden on EV owners does not discourage the shift toward cleaner technologies. This conundrum complicates the design of revenue mechanisms that fairly distribute the cost of infrastructure while also supporting the transition to more energy-efficient

vehicles. To address these issues, policymakers increasingly seek to explore alternative revenue generation approaches, such as VMT tax or road usage charges (RUC). Another option could be to implement a per-kilowatt-hour fee when charging EVs, a mechanism that mirrors the traditional concept of taxing vehicles directly as they refuel. These mechanisms could provide a more equitable way of funding transportation projects while avoiding the potential disincentive effect of additional fees on EVs. Ultimately, the challenge lies in finding a sustainable and fair method to generate the necessary funds for infrastructure maintenance and development while ensuring that the transition to new vehicle technologies is not hindered. The current study analyzes the different mechanisms implemented by various states to address these issues, examining the current fee structure charged in each state. The study also presents a user-friendly spreadsheet tool designed to predict future revenue losses and calculate the corresponding fee structure needed under the EV fee recovery mechanisms.

7. Alternative Mechanisms of EV Recovery fee

The development of effective recovery EV fee mechanisms requires a nuanced approach that considers vehicle class and balances multiple objectives: revenue sufficiency, EV adoption support. Historical vehicle usage data reveals a concerning trend in transportation funding sustainability. As such, several alternative revenue mechanisms have emerged across U.S. states:

1. EV Registration Fee (or supplemental fee):
    - Annual lump-sum payments
    - Periodic payment structures
2. Distance-Based Mechanisms:
    - Vehicle miles traveled (VMT) fee systems
    - Weight Distance Fee
3. Usage-Based Mechanisms:
    - Pay-as-you-charge systems ($/kWh)

Each mechanism warrants a detailed examination of its key operational features, comparative advantages and disadvantages, and its policy implementation considerations. The adoption of EV recovery fee suggests a shift from traditional funding mechanisms toward more dynamic and adaptable revenue collection systems that reflect contemporary vehicle technology and usage patterns.

7.1. EV Annual Registration Fee

The annual lump-sum EV recovery fee system has several advantages regarding revenue generation. As a vehicle ownership-based collection method, it provides reliable revenue streams and seamlessly integrates with existing vehicle registration systems. This mechanism requires minimal public education and implementation cost, contributing to its widespread adoption across the states. However, the mechanism presents significant limitations. The requirement for high upfront payment can potentially deter EV adoption, particularly for heavy vehicle classes. The fee structure's lack of usage-based considerations creates potential inequities between high and low-mileage users, while potentially counteracting state and federal EV purchase incentives. The annual registration fee for EVs is considered as a supplemental fee, in addition to their standard vehicle registration fees which are generally charged for traditional ICEVs.

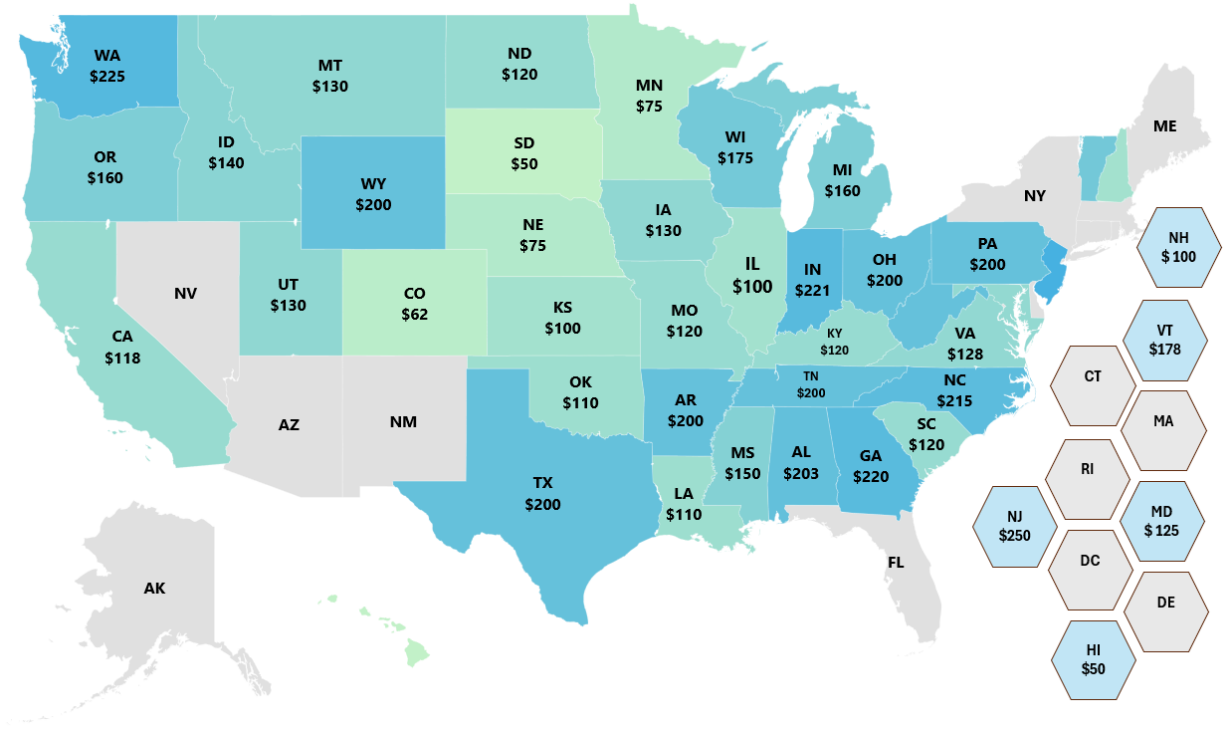

Figure 5: Annual Registration Fee of EVs in various states

The data on EV annual registration fees across various U.S. states (Figure 5), reveals a wide range of fee levels, with some states charging significantly higher fees than others (NCSL, 2024). The fees range from as low as $50 in Colorado, Hawaii, South Dakota, and New Mexico, to as high as $250 in New Jersey. Many states charge fees in the $100–$200 range, including Arkansas ($200), and Indiana ($214). Other states with notable fees include Pennsylvania ($200), Ohio ($200), Texas ($200), and Michigan ($160). States have developed diverse approaches to fee structuring. Utah, for example, implements a $130 annual fee while offering an optional road user charge program. In Virginia, EV owners pay a $128 annual highway use fee in 2024 or 85% of the equivalent fuel tax. States like Michigan, Missouri, Montana, and Oklahoma implement tier-based systems for EV fees based on vehicle weight classifications. For instance, Oklahoma imposes a significant fee of

$2,250 on EVs exceeding 26,000 pounds. Some states like Alaska, Connecticut and Delaware, do not have a fee implemented yet. This variation suggests differences in the states' approaches for levying fees for EVs using the annual registration fee mechanism. The full dataset is available in Appendix 2A.

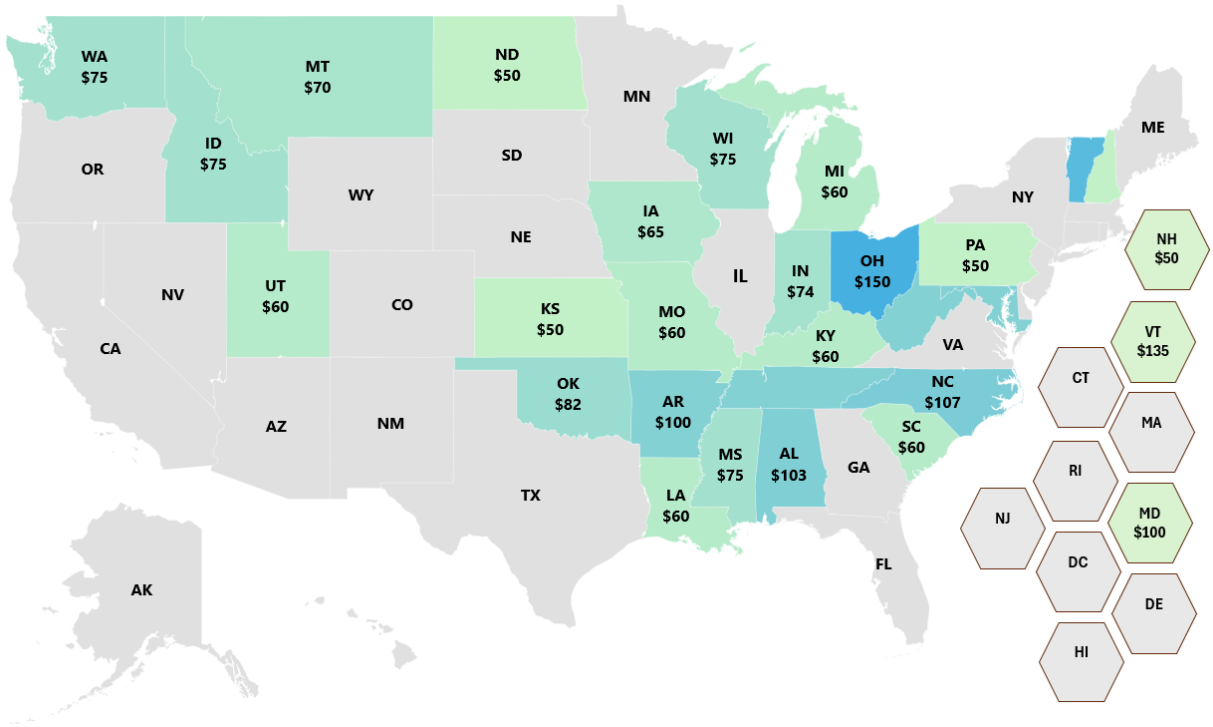

Figure 6: Annual Registration Fee of HEVs in various states

Certain states have established fees specifically for HEVs. HEV registration fees vary by state, with charges typically compared to fees for all-electric EVs but are designed to offset lost fuel tax revenue. Fees range from $50 in Kansas, North Dakota and Pennsylvania to $150 in Ohio. Indiana ($74), Iowa ($65), Oklahoma ($82), Louisiana ($60) and South Carolina ($60) are among other states which charges a supplemental fee for HEVs. These fees aim to ensure HEV owners contribute their share to road maintenance and infrastructure funding.

The analysis suggests that offering periodic payment options, such as monthly or quarterly installments, could effectively mitigate the upfront cost burden while maintaining consistent levels of revenue generation. The variety in state approaches demonstrates ongoing experimentation with fee structures as jurisdictions seek to balance revenue needs with EV adoption goals. This diversity in implementation strategies reflects the complex challenge of developing equitable and sustainable funding mechanisms for transportation infrastructure in an evolving vehicle market.

7.2. Vehicle Miles Traveled fee (VMT Fee)

The VMT fee, alternatively termed Road Usage Charge (RUC), represents a usage-based revenue mechanism calculated per mile driven. This approach offers the advantage of distributed cost burden over time, potentially reducing the immediate financial impact on road users. However, the system presents several complex challenges, including possible deterrence of long-distance EV usage, and disparate effects on rural versus urban drivers. Additional concerns include privacy issues related to mileage monitoring and substantial administrative costs associated with tracking technology and account management. Implementation status as of August 2024 includes four states with operational RUC programs: Oregon, Hawaii, Utah, and Virginia, with Connecticut operating a commercial truck-specific program. Oregon's OReGO program charges 1.8 cents per mile with fuel tax credits, while Utah implements a 1.52 cents per mile rate capped at the state's flat registration fee. Hawaii offers dual options for EVs: 0.8 cents per mile for EVs or a $50 annual flat fee. Virginia's innovative Mileage Choice Program provides an alternative to its Highway Use Fee, with mileage rates capped at the equivalent annual fee based on the state average annual travel of 11,600 miles.

Several states in the U.S. are actively involved in state pilot programs, studies, or sponsored research to explore road usage charges (RUC) as an alternative or supplement to traditional fuel taxes. States currently conducting such initiatives include Washington, California, Wyoming, Colorado, Kansas, Oklahoma, Minnesota, Missouri, Ohio, Pennsylvania, North Carolina, Georgia, Maine, New Hampshire, Vermont, New Jersey, Delaware, and Maryland. These programs focus on evaluating the feasibility, equity among vehicle classes, and potential revenue impacts of RUC systems, aiming to address challenges posed by increasing fuel efficiency and the growing adoption of EVs. In addition, some states, including New Mexico, Kentucky, New York, and Connecticut, have implemented weight-distance fees for commercial vehicles, which are distinct from RUC systems (which focus on passenger vehicles) (Figure 7). Current U.S. implementations demonstrate higher operational costs compared to fuel tax collection, with some programs operating at a net loss after accounting for collection expenses. The feasibility faces substantial political challenges, because to achieve financial sustainability for States, successful implementation would require higher per-driver costs compared to the current fuel tax or prospective EV fees.

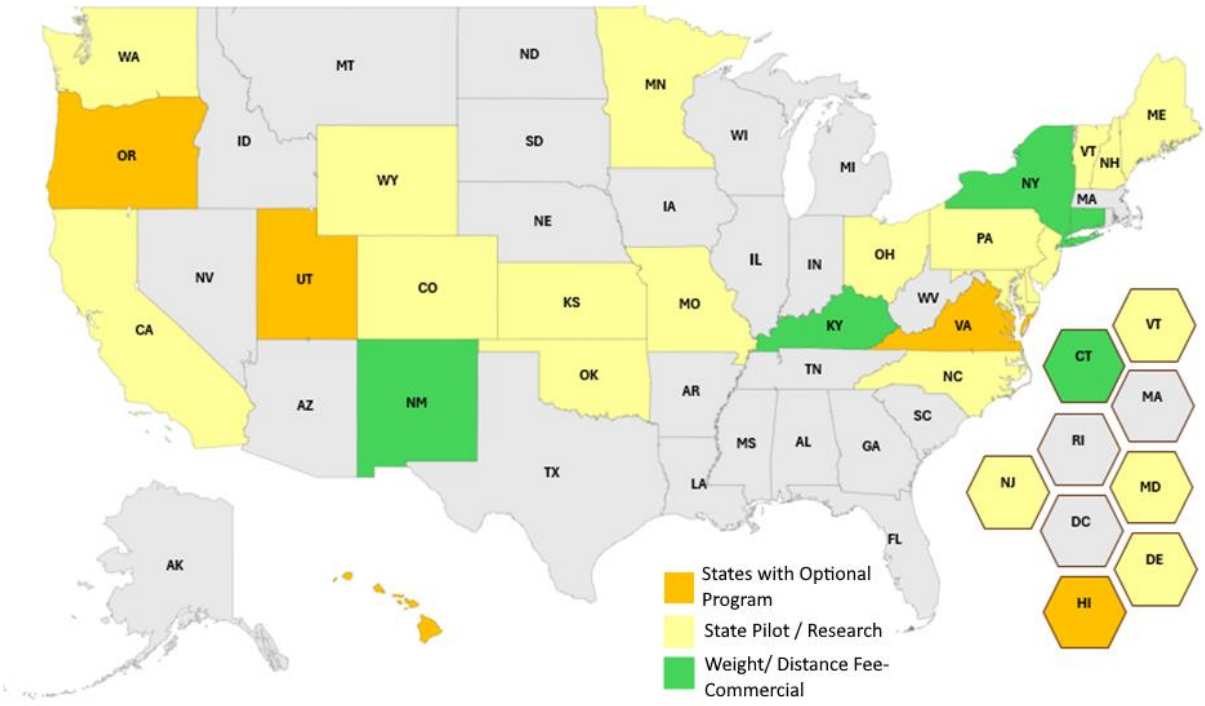

Figure 7: States with RUC (VMT Fee) program

7.3. Pay-as-you-charge (PAYC) ($/kWh)

The electricity consumption-based EV recovery fee system ($/kWh) presents both promising features and significant implementation challenges. This approach mirrors the familiar pay-at-the-pump mechanism for fuel tax revenue collection, potentially facilitating public acceptance and administrative implementation through consolidated transaction points. The distributed cost structure reduces immediate financial impact on users. However, several critical limitations emerge. The predominance of home charging (approximately 80%) creates substantial measurement challenges in distinguishing EV electricity consumption from general household usage. This challenge extends to workplace and public charging locations, particularly where charging services are provided without direct transaction costs. Implementation requires sophisticated infrastructure including submetering systems or smart chargers, raising concerns about privacy and installation costs.

Several states have implemented or are planning per-kilowatt-hour excise tax programs to generate revenue from EV charging at public charging stations. Pennsylvania, since 1997, has taxed electricity on a gasoline gallon equivalent basis, with the rate at 1.72 cents per kilowatt-hour as of 2022. Iowa began a flat 2.6 cents-per-kWh tax in 2019, while Oklahoma introduced a flat 3 cents-per-kWh tax in 2021. Kentucky implemented a 3 cents-per-kWh tax in 2022, indexed to the National Highway Construction Cost Index (NHCCI). Georgia, in 2023, taxes electricity at a rate equivalent to a gallon of gas (1 gallon = 11 kWh), with adjustments based on CAFÉ standards and the Consumer Price Index (CPI). Utah applies a 12.5% tax on what a charging station charges per-kWh, per-hour, or by subscription, starting in 2023. Montana and Wisconsin have also adopted a

flat 3 cents-per-kWh tax, with Wisconsin set to begin in 2024. The cost of electricity excise tax, equivalent to fuel consumption, is calculated based on the concept of Gasoline Gallon Equivalent (GGE). GGE is a unit used to compare the energy content of various fuels to that of a gallon of gasoline, providing a standardized way to assess energy use and costs across different fuel types. For example, one GGE is approximately 33.6 kWh for electricity (used in electric vehicles) and 37.2 kWh for special fuels. This metric allows for a consistent comparison between gasoline, special fuels, and electricity, simplifying calculations for energy consumption and costs, particularly regarding EV charging.

The PAYC mechanism requires significant institutional coordination between utilities, state DOTs, and regulators to establish effective revenue collection mechanisms, particularly for home charging. The approach could incorporate weight-based considerations through electricity consumption correlation. However, the system's limited capture of charging activities potentially creates disproportionate impacts on lower-income users who rely more heavily on public charging infrastructure. Furthermore, this mechanism fails to address the broader challenge of revenue decline due to higher fuel efficiency, suggesting its inadequacy as a standalone solution for transportation funding in the near to medium term. PAYC success requires the development of new utility tariff structures encouraging beneficial charging behaviors while maintaining revenue generation capabilities.

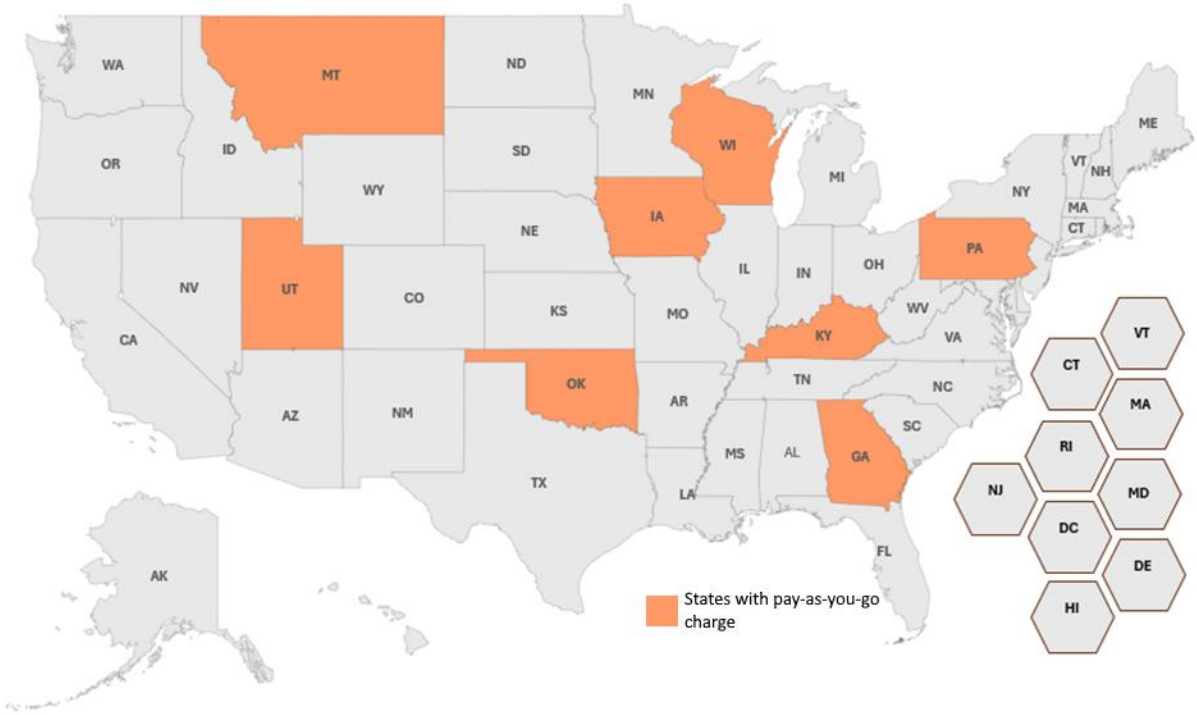

Figure 8: States with a Pay-as-you-charge ($/kWh) program

7.4. Comparison of Alternative Mechanisms

Table 1 summarizes a broad comparison of these alternative mechanisms.

Table 1 – Comparison of Alternative Mechanisms

Mechanism	Description	Advantages	Disadvantages	Policy Considerations
Annual EV Fee	Single annual payment structure for EV recovery fees	• Stable revenue through vehicle ownership • Aligns with existing registration systems • Low implementation and administrative costs	• High upfront cost burden • May discourage EV adoption • Lacks usage-based considerations • Unsustainable in shared mobility future	• Need to address mileage-based disparities • Potential conflict with EV incentives • Opportunity for integration with other mechanisms
Periodic Payment System	Distributed payment schedule (monthly/quarterly)	• Reduced immediate financial burden • Stable revenue stream • Consistent with ownership-based collection	• May still impede EV adoption if cumulative payments are high • Lacks usage-based metrics • Limited sustainability in shared mobility scenarios	• Applicable primarily to high-fee vehicle classes • Requires threshold determination • Need for payment processing infrastructure
VMT Fee	Mileage-based usage fee ($/mile)	• Distributed payment structure • Flexible parameter adjustment • Enhanced infrastructure investment targeting • Usage-based equity	• High administrative costs • Privacy concerns • Rural-urban acceptance disparities • Complex implementation	• Multi-state coordination needs • Potential combination with weight-based fees
Pay-As-You-Charge System	Electricity consumption-based tax ($/kWh)	• Distributed cost structure • Familiar payment mechanism • Efficient collection through consolidated points	• Complex measurement requirements • Home charging separation challenges • Privacy concerns • May discourage charging infrastructure	• Requires advanced metering infrastructure • Need for utility-DOT-regulator coordination • Opportunity for incentive-based tariffs

As seen above, various mechanisms for EV revenue generation offer distinct advantages and challenges. **Annual EV fees** provide stable revenue with low administrative costs and align with existing systems but may burden owners with high upfront costs, discourage EV adoption, and lack mileage-based equity. A **periodic payment system**, with distributed schedules, eases

immediate financial burdens but requires infrastructure for processing and may still lack usage-based fairness. A **pay-as-you-charge system**, taxing electricity consumption, distributes costs efficiently and integrates with familiar models but faces challenges in measurement, home charging separation, and privacy concerns. Lastly, a **vehicle-miles-traveled (VMT) fee** promotes usage-based equity and better targets infrastructure investments but involves high administrative costs, privacy concerns, requiring robust multi-state coordination. However, it is recommended that the States consider implementing recovery fees in a phased manner to minimize the adverse financial impact of EV fees while supporting a balanced adoption of EVs.

8. Legislative Landscape and Policy Implementation Challenges

The current landscape of transportation funding reveals widespread legislative activity across the United States, with 224 bills under consideration in 39 states as of July 2023, including 37 specifically addressing EV fees (TIAC, 2023). This legislative momentum reflects growing concern about declining motor fuel tax revenues amid increasing EV adoption, particularly affecting states heavily dependent on traditional funding mechanisms like fuel taxes and registration fees.

At the federal level, the Infrastructure Investment and Jobs Act (IIJA) has initiated significant policy development through the "National Motor Vehicle Per-Mile User Fee Pilot" program, allocating $50 million over five years. This initiative aims to evaluate design feasibility, public acceptance, implementation challenges, and financial sustainability of a national per-mile fee system (Enotrans, 2023). State-specific implementations demonstrate varying approaches and challenges. Pennsylvania's experience with alternative fuels taxation since 2005 highlights enforcement difficulties, particularly regarding at-home EV charging reporting requirements, leading to proposed legislation for a $290 annual registration fee as an alternative. Iowa's implementation of an electric fuel excise tax alongside annual EV registration fees faced technological barriers, resulting in delayed implementation until July 2023, with notable exclusion of at-home charging.

The transition to alternative funding mechanisms demands careful consideration of multiple factors across several key dimensions. Regarding cost distribution and equity, policymakers must strike a delicate balance between maintaining EV adoption incentives and securing adequate infrastructure funding, while ensuring fair contributions across different vehicle types and user groups. The technical and administrative landscape presents its own set of challenges, including the critical need for robust privacy protection in usage monitoring, development of cost-effective implementation strategies, and establishment of reliable measurement systems that can accurately track and assess vehicle usage patterns.

Implementation strategy considerations extend to the formation of effective public-private partnerships, which are essential for successful program deployment. These partnerships must be supported by robust enforcement mechanisms and user-friendly payment systems that facilitate compliance while minimizing administrative burden. The development of progressive policy approaches represents another crucial element, encompassing graduated fuel tax increase programs, differential toll structures based on vehicle type, and seamless integration with existing

transportation funding mechanisms. This complex policy environment necessitates a balanced approach that maintains similar levels of infrastructure funding. This must be accomplished while successfully navigating the intricate web of technological, administrative, and public acceptance challenges that characterize the modern transportation funding landscape. The ability to harmonize these various elements while maintaining public support and operational efficiency will be crucial for the long-term viability of alternative funding mechanisms.

9. Revenue Recovery Assessment Framework and Tool (RRAFT)

A comprehensive revenue recovery assessment tool was developed as part of the current study, to evaluate the fiscal implications of increasing EV adoption across all U.S. states and the District of Columbia. This tool enables transportation agencies to examine historical trends and project future revenue scenarios based on various adoption patterns. The tool incorporates critical historical data, including average growth rates and Vehicle Miles Traveled (VMT) distributions across different vehicle categories: motorcycles, light-duty vehicles, buses, and trucks. Users can manipulate key parameters such as projected annual growth rates for both EVs and HEVs, along with their respective market entry or "sunrise" years.

The tool's sophisticated modeling capabilities extend beyond basic revenue projections to provide detailed analysis across multiple vehicle classifications and revenue mechanisms. The tool calculates potential revenue losses from both EV and HEV adoption, under four vehicle classes comprising of motorcycles, light duty vehicles, buses and trucks. The tool generates projections of realizable revenues and suggests appropriate recovery fees based on the three revenue recovery mechanisms. It calculates specific metrics such as per-vehicle recovery fees (as annual registration fees), VMT fees (measured in cents per mile), and electricity excise fees (measured in cents per kilowatt-hour). While the model's primary focus is predicting potential revenue losses due to EV and HEV adoption, its user-friendly interface and comprehensive analytical capabilities make it an invaluable resource for state agencies engaged in transportation funding planning and policy development. This facilitates informed decision-making regarding future revenue recovery strategies. However, it may be noted that this tool is designed as a generic framework applicable to all U.S. states and State-specific criteria or unique local conditions are not modeled by default. Users requiring customized adjustments to accommodate state-specific parameters are encouraged to contact the author for tailored modifications.

9.1. Assumptions

The key assumptions used in the tool include:

- The VMT distribution across vehicle classes is assumed to remain the same across the analysis period (2023-2050). The values used are from Year 2022.
- Annual growth for EVs and HEVs follows a geometric pattern.
- The start (sunrise year) count for EVs and HEVs in vehicle classes other than LDVs, is assumed to be 500 vehicles.

- The geometric mean of fuel efficiency improvements for ICEVs over 2015–2022 is estimated as 0.07% for motorcycles, 0.51% for LDVs, 0.19% for buses, and 1.90% for trucks. However, the average annual increase for future projections is set as 0.50% for motorcycles, 1.00% for LDVs, 0.50% for buses, and 2.00% for trucks.
- The fuel efficiency improvement for HEVs is assumed to be 1.5 times that of ICEVs.
- Gasoline Gallon Equivalent (GGE) is set at 33.6 kwh and special fuel GGE is set at 37.2 kwh.
- The vehicle growth rate for the total category is calculated as the maximum of 2.5% and the minimum of 0.5% or the actual geometric mean of the past 7 years
- Gas tax and special fuel tax rates for 2023 till 2050 are determined based on trend analysis of rates from 2005 till 2022.

9.2. Sample Computation for Assessment of Revenue Recovery

The following example calculation is presented for the state of Indiana for the year 2026.

Assumptions and Key Inputs

- **Projected Gas Tax Rate**: 38 cents per gallon
- **Projected Light Duty ICEV Fuel Efficiency**: 23.726 miles per gallon
- **Projected Number of EVs (in LDV category)**: 25,915 (Assuming 10% annual growth)
- **Projected Total VMT in Indiana (all vehicles):** 88,398 million miles
- **Projected Number of LDVs**: 5,527,985
- **Proportion of VMT by LDVs:** 83.034%

Step 1: Calculate Total VMT for LDVs

$$\text{Total LDV VMT} = 88{,}398 * 83.034\% = 73{,}400 \text{ million vehicle} - \text{miles}$$

Step 2: Calculate VMT for EV LDVs

$$\text{EV VMT} = \left(\frac{\text{EV LDVs}}{\text{Total LDVs}}\right) * \text{Total LDV VMT}$$

$$= \left(\frac{25{,}915}{5{,}527{,}985}\right) * 73{,}400 = 344.10 \text{ million vehicle} - \text{miles}$$

Step 3: Estimate Annual Revenue Loss Due to EVs

$$\text{Revenue Loss} = \left(\frac{\text{EV VMT}}{\text{Fuel Efficiency}}\right) * \text{Gas Tax Rate}$$

$$= \left(\frac{344.10 * 10^6}{23.726}\right) * 0.38 = \$\,\mathbf{5{,}511{,}169}$$

Step 4: Calculate Revenue Loss per EV Vehicle

$$\text{Revenue Loss per EV Vehicle} = \frac{\text{Annual Revenue Loss}}{\text{Number of EVs}}$$

$$\text{Revenue Loss per EV Vehicle} = \frac{\$5{,}511{,}169}{25{,}915} = \$\mathbf{213}\ /\ vehicle$$

Step 5: Calculate VMT per LDV in 2026

$$\text{Average LDV VMT Per Vehicle} = \frac{\text{Total LDV VMT}}{\text{Number of LDVs}}$$

$$\text{Average LDV VMT Per Vehicle} = \frac{73{,}400 * 10^6}{5{,}527{,}985} = 13{,}278\ \text{vehicle} - \text{miles/year}$$

Step 6: Calculate Revenue Loss per EV Vehicle per Mile

$$\text{Revenue Loss per EV Vehicle per Mile} = \frac{\text{Revenue Loss per EV Vehicle}}{\text{Average LDV VMT Per Vehicle}}$$

$$\text{Revenue Loss per EV Vehicle per Mile} = \frac{\$213}{13{,}278} = \$\ 0.0160\ /\ mile\ (or\ 1.6\ cents\ per\ mile)$$

In 2026, the projected annual revenue loss per EV due to the absence of fuel tax contributions is estimated at **$213**, with a revenue loss per EV per mile of **1.6 cents per mile**. These calculations were based on Indiana's projected gas tax rate of 38 cents per gallon, total VMT of 88,398 million vehicle-miles, LDV fuel efficiency of 23.726 mpg, and the share of EVs among 5.52 million LDV registrations. The projections of key variables – such as fuel tax rates, total VMT, annual fuel tax revenues, VMT splits, vehicle registrations, and fuel efficiency – are made using relevant assumptions as stated earlier in this section.

10. Findings from the RRAFT tool

To demonstrate the functionality of the RRAT tool, a sample output for all U.S. states was generated using projected data for the year 2030. The analysis incorporates assumptions across various vehicle categories. For light-duty vehicles, an annual EV growth rate of 15% and HEV growth rate of 10% are assumed. For motorcycles, buses, and trucks, the EV market is expected to grow at 15% annually starting from the 2025 sunrise year, while hybrid electric vehicles (HEVs) are projected to grow at 5% annually, also commencing in 2025. These assumptions support the framework that models and visualizes revenue impacts and equity implications of EV fee structures across different vehicle types and market penetration scenarios.

Annual Registration Fee: Light Duty Vehicles

Projected revenue recovery fees for EVs in 2030 (Figure 9), calculated to replace lost fuel tax revenues from light-duty vehicles (LDVs), reveal significant variation across states. **California ($256)**, **Indiana ($225), Pennsylvania ($218)** and **Maryland ($209)** have the highest proposed fees, reflecting the substantial contributions of their LDV fuel taxes. On the lower end, **Alaska ($25)**, **Hawaii ($53)**, and **Nevada ($81)** project the smallest fees. These fees highlight state-level differences in vehicle travel patterns, tax policies, vehicle travel pattern and reliance on fuel tax revenues. Across all states, the proposed EV fees average approximately **$128**, with most states clustering between **$80** and **$170**.

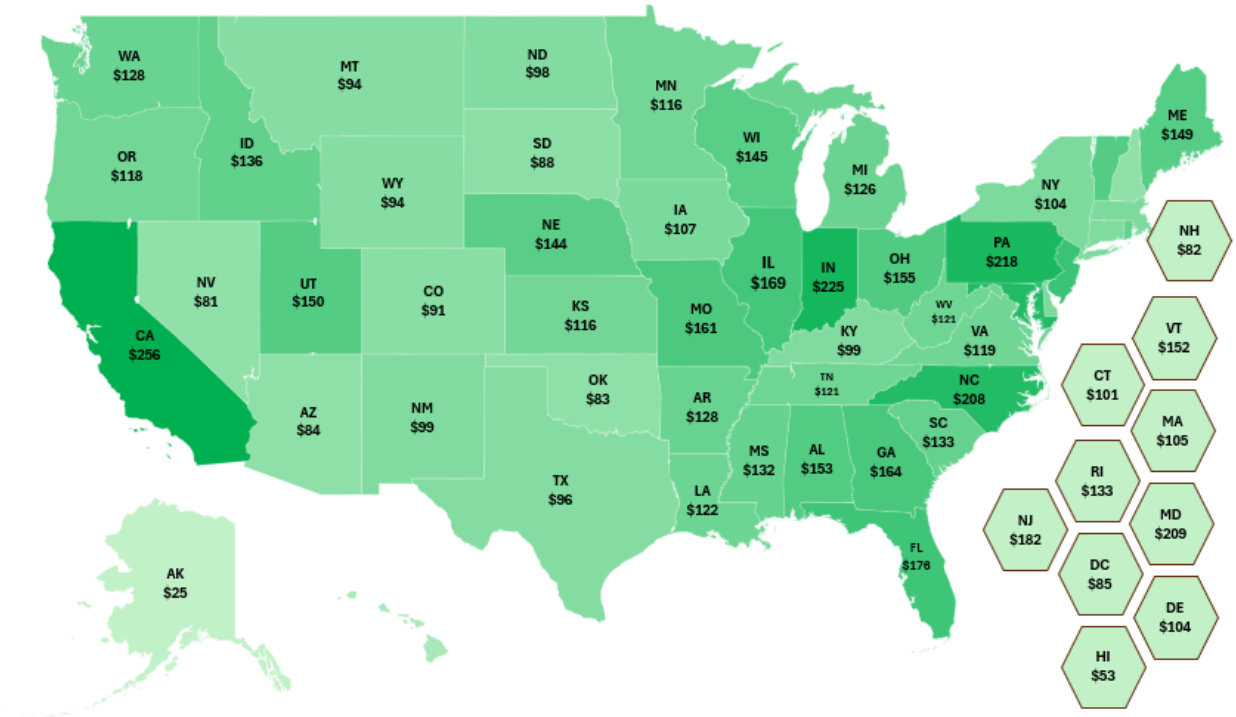

Figure 9: Projected Annual EV Recovery Fee for LDVs in various states in 2030

Annual Registration Fee: Motorcycles

The projected revenue recovery fees for motorcycles in 2030 (as shown in Figure 10) show significant variation across states, reflecting differences in fuel tax contributions and usage patterns. The highest fees are projected for **California ($144)**, **Missouri ($35)**, and **Alabama ($33)**, indicating their higher reliance on fuel tax revenues generated by motorcycles. In contrast, states like **Iowa ($1)**, **Montana ($1)**, **North Dakota ($2)** and **Alaska ($2)** require the lowest fees, reflecting minimal contributions from motorcycle usage to fuel tax revenues.

The average proposed fee for motorcycle classes across all states is approximately **$15**, with most states falling in the range of **$5 to $20**. These fees aim to equitably recover lost fuel tax revenue from motorcycles as the vehicle fleet transitions toward alternative fuel sources. The variability in fees demonstrates state-specific approaches to addressing revenue gaps while maintaining sustainable transportation funding for road maintenance and infrastructure development.

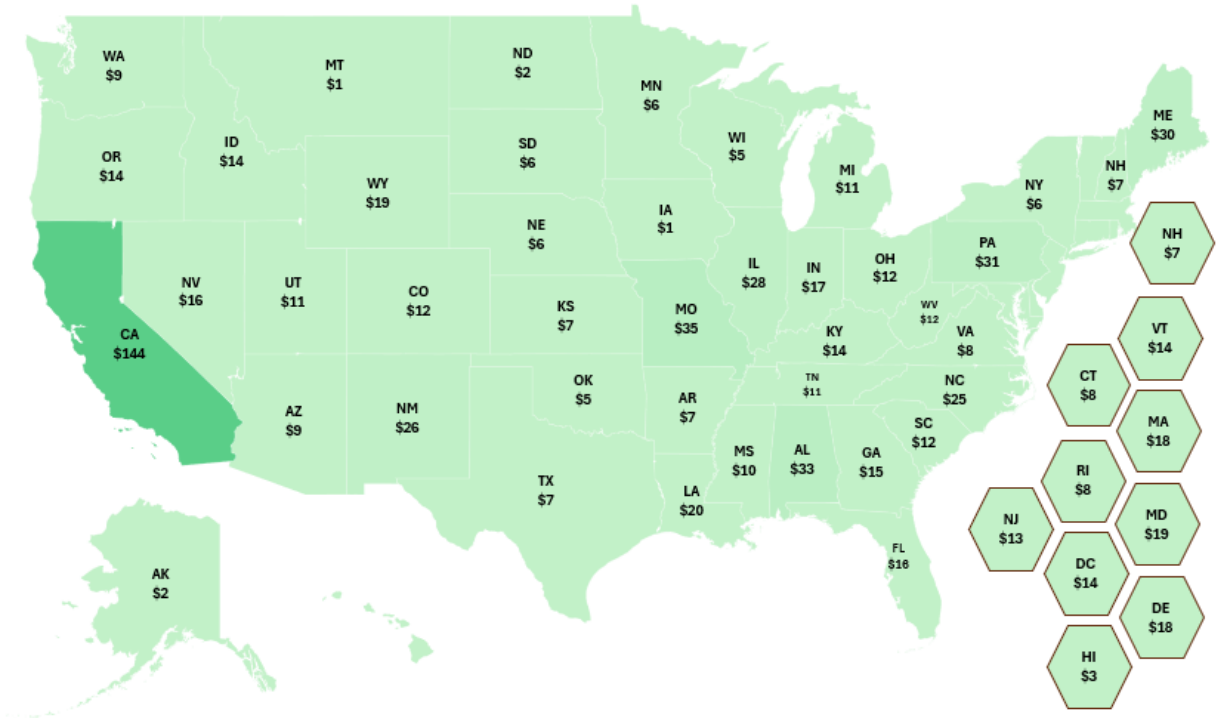

Figure 10: Projected Annual EV Recovery Fee for motorcycles in various states in 2030

Annual Registration Fee: Buses

The projected revenue recovery fees for buses in 2030 (Figure 11) reflect significant variation across states, with fees based on state-specific fuel tax revenue contributions from bus operations. At the high end, **Oklahoma ($2,686), Alabama ($2,618)**, and **California ($2,433)** have the highest projection of the fees. These figures indicate a substantial reliance on fuel tax revenues generated by bus operations and higher anticipated VMT for buses. Conversely, states such as **Alaska ($24)**, **Nebraska ($111)**, **Kansas ($130)** and **Tennessee ($144)** project the lowest fees, likely due to minimal contributions from buses to state fuel tax revenues or less extensive bus activity. The average projected fee for buses across states is approximately **$868**, with most states clustering between **$200 and $1,400**.

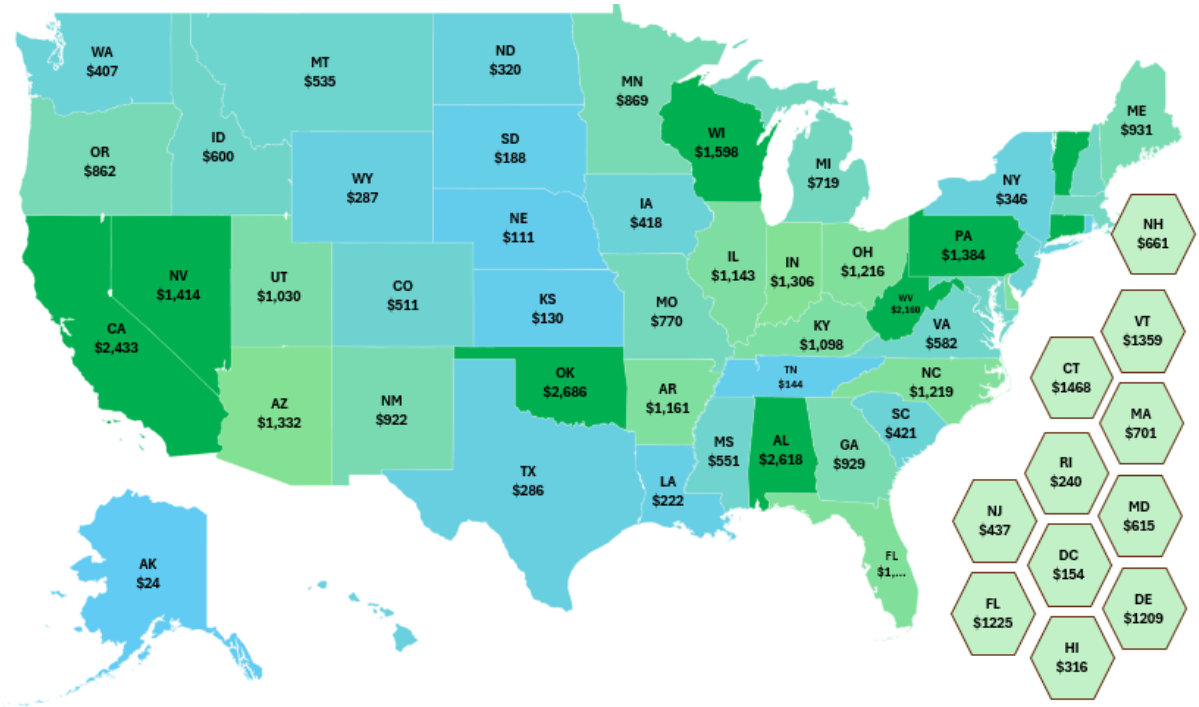

Figure 11: Projected Annual EV Recovery Fee for buses in various states in 2030

Annual Registration Fee: Trucks

The projected revenue recovery fees for trucks in 2030 (Figure 12) display a wide range across states, reflecting the variations in the fuel tax rates and the extent of trucking operations in each state. **Utah ($3,394)** and **Tennessee ($2,136)** stand out as the states with the highest projected fees, likely attributed to their significant trucking VMT and the critical role of freight transport in their economies. Following closely are **Arizona ($1,820), Nevada ($1,768)** and **Connecticut ($1,544)**, both indicating a substantial need for revenue recovery from trucking-related fuel tax declines. At the lower end, states such as **D.C. ($90)**, **Alaska ($102)**, and **Montana ($190)** have minimal projected fees, potentially due to limited trucking activity or lower fuel tax reliance for highway funding.

On average, the proposed fees for trucks hover around **$862**, with most states falling between **$200 and $1,500**. These fees underscore the need to address the fiscal challenges posed by the shift to electric trucks. The analysis reflects state-specific dynamics, including the extent of freight movement, infrastructure demands, and funding structures, ensuring that the fees align with the revenue recovery needs of each state.

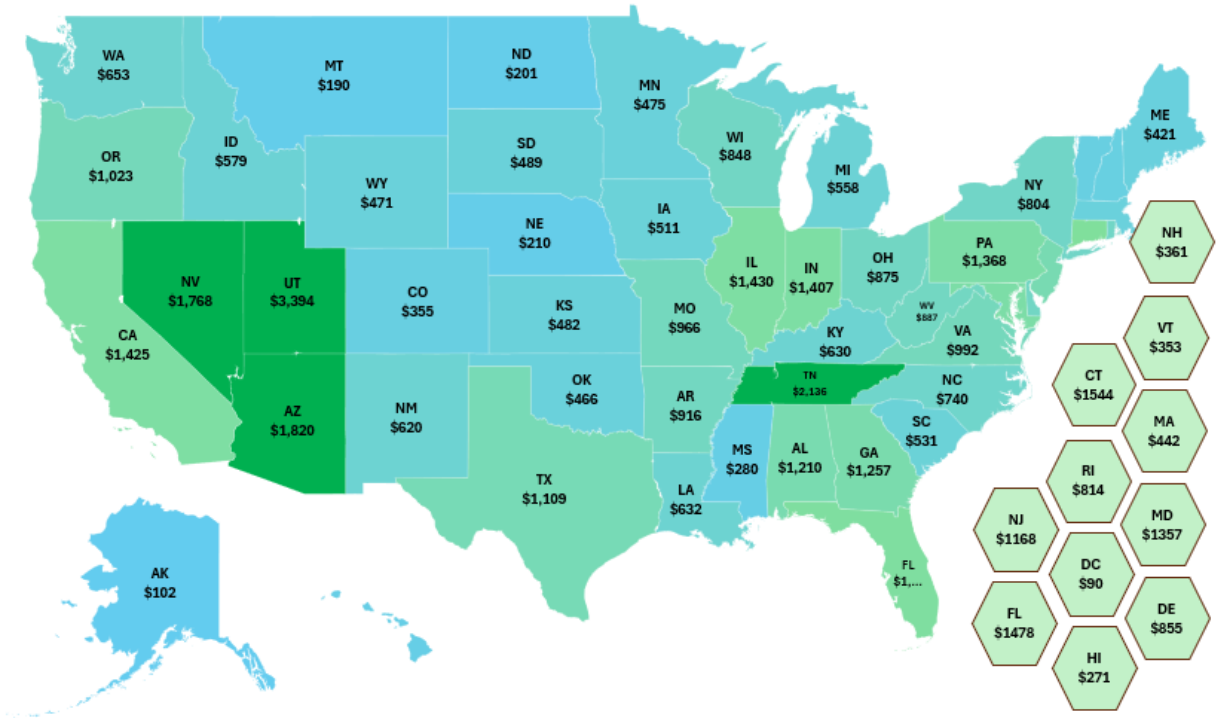

Figure 12: Projected Annual EV Recovery Fee for trucks in various states in 2030

Annual Registration Fee: VMT Fee – Light Duty Vehicles

The projected VMT fee or cents-per-mile rate for light-duty vehicles (LDVs) in 2030 (Figure 13) varies significantly across states, reflecting diverse transportation needs, road usage patterns, and revenue recovery requirements. At the higher end, **California (¢2.84/mile)**, **Pennsylvania (¢2.43/mile)**, **Washington (¢2.00/mile)** and **Maryland (¢1.82/mile)** exhibit the highest rates.

Conversely, states such as **Alaska (¢0.32/mile)**, **Hawaii (¢0.65/mile), New Mexico (¢0.69/mile) and Mississippi (¢0.73/mile)**, and demonstrate the lowest rates. On average, the rates cluster around **¢1.2 per mile**, indicating a general trend towards balanced cost distribution among light-duty vehicle users. This variation underscores the importance of state-specific strategies to address infrastructure funding gaps due to declining fuel tax revenues from increasing EV adoption.

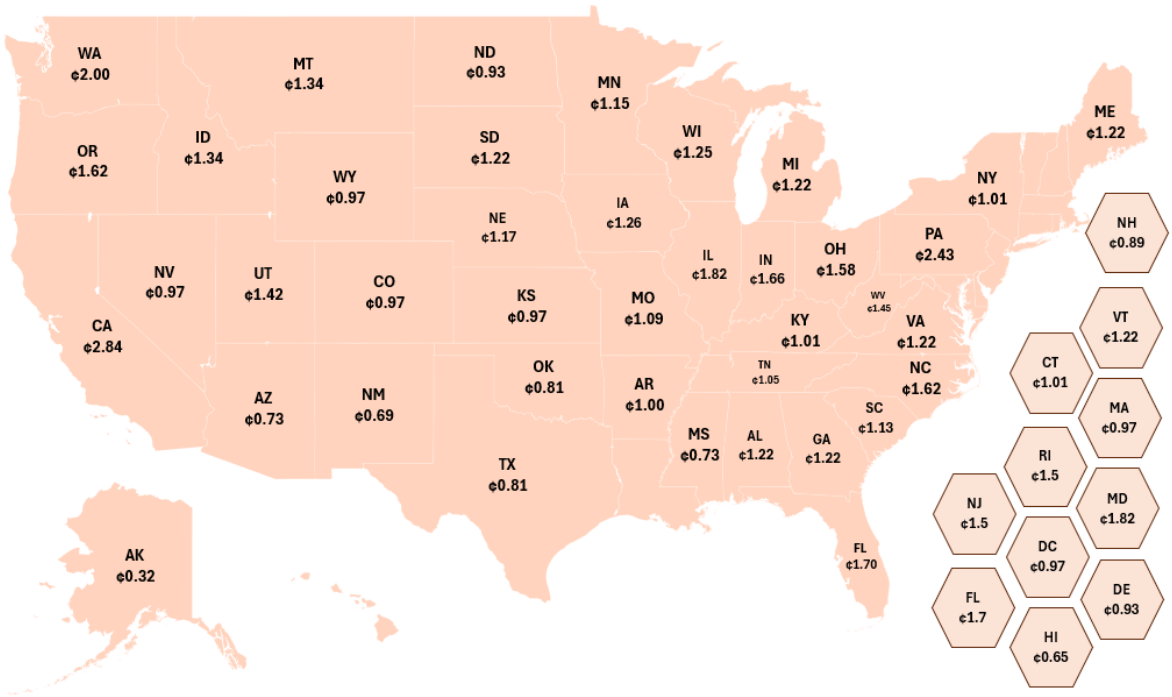

Figure 13: Projected VMT Fee for LDVs in various states in 2030

Pay-as-you-go Charge: Light Duty Vehicles

The cents per kilowatt-hour (¢/kWh) rates for public EV charging stations in 2030 (Figure 14) vary significantly across states, owing to the varying tax rates in these states. States like **California (¢2.08/kWh), Pennsylvania (¢1.79/kWh), Washington (¢1.47/kWh)** and **Maryland (¢1.34/kWh)** have some of the highest charging rates. In contrast, states such as **Alaska (¢0.24/kWh)** and **Hawaii (¢0.48/kWh)** have relatively low rates. Most states fall within a moderate range, typically between **¢0.60 and ¢1.30/kWh**.

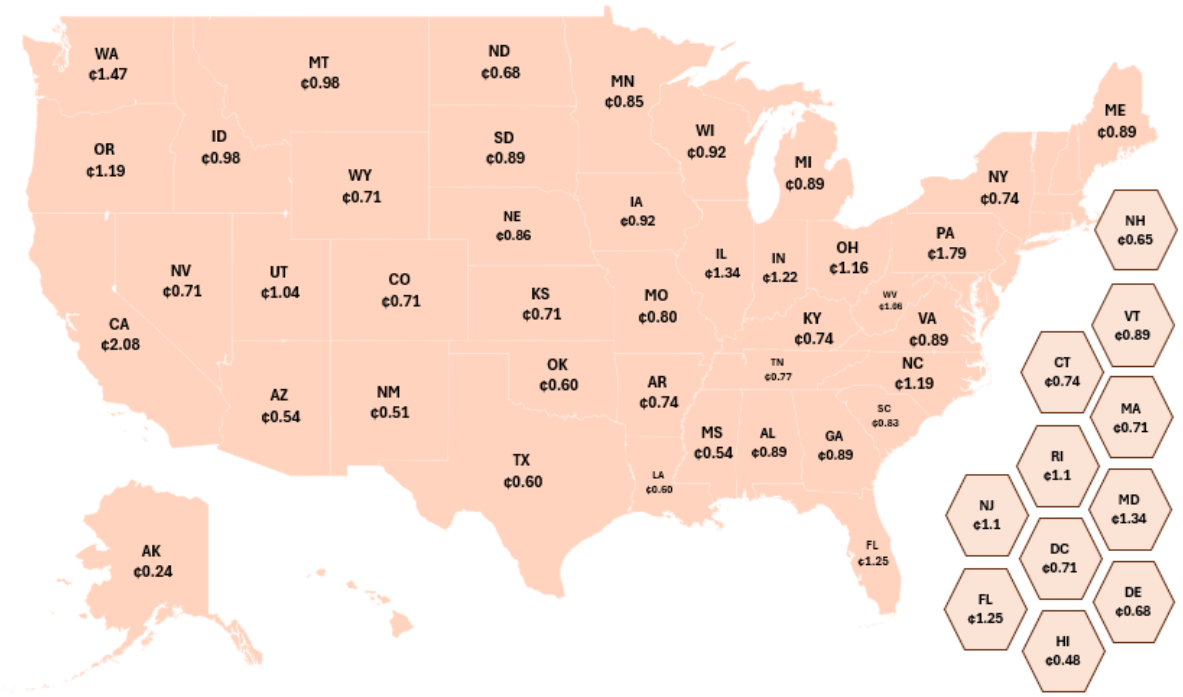

Figure 14: Projected cents per kilowatt-hour Fee for LDVs in various states in 2030

Projected Change in Revenue

The percentage changes in revenue between actual collection in 2022 and projected revenue for 2030 across U.S. states reveal a wide range of negative trends, highlighting the challenges many regions face in adapting to evolving financial dynamics. The most significant declines are observed in states like **New Jersey (-14%)** and the **District of Columbia (-12%)**, indicating substantial revenue losses. Similarly, states like **Hawaii (-7%)** and **Vermont (-6%)** reflect notable declines, emphasizing their vulnerability to the changes in usage of alternative fuels. Moderate declines are evident in states such as **Oregon (-5%), Maryland (-4%),** and **Massachusetts (-4%).** States like **Delaware (-4%), Florida (-4%),** and **Colorado (-4%)** also demonstrate significant but slightly less pronounced reductions. A cluster of states shows declines in the low-to-mid single digits, including **Utah (-4%), Connecticut (-2%), Georgia (-2%),** and **Michigan (-2%).** On the lower end of revenue decreases, states like **Indiana (-2%), Iowa (-1%),** and **Mississippi (-1%)** reflect minimal changes, suggesting either stable revenue sources or less exposure to factors affecting other regions.

States like **Alabama (-1%), Louisiana (-1%),** and **Kentucky (-1%)** exhibit limited revenue changes, further highlighting the variability in financial impact across the country. Addressing these challenges will likely require innovative policy solutions and investment in sustainable revenue sources, particularly in states experiencing the largest projected declines.

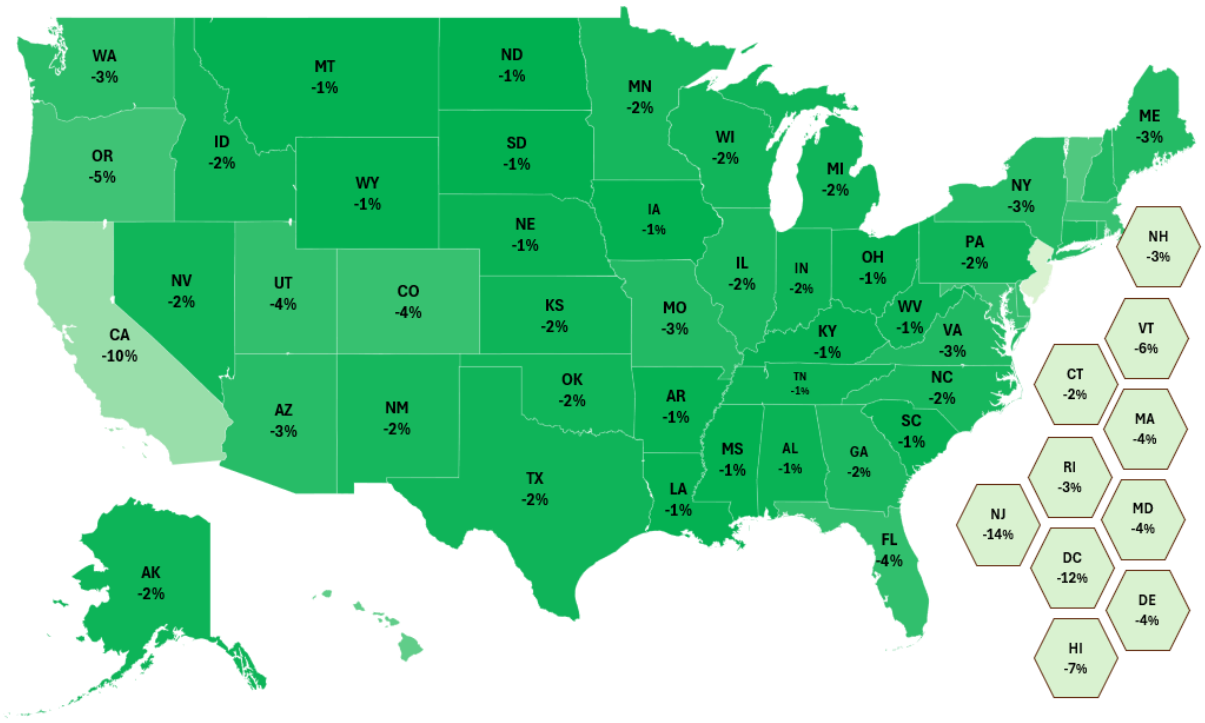

Figure 15: Projected percentage difference (Loss in Fuel Tax Revenue from ICEVs) in 2030

11. Conclusion

The electrification of the transportation sector is rapidly gaining momentum, driven by advancements in vehicle technology, and supportive government policies. This shift presents a critical challenge to the traditional mechanism of transportation funding, which has long relied on fuel taxes. As EVs do not consume gasoline, they do not contribute to the fuel tax revenue that has historically funded road maintenance and construction. This necessitates the exploration and implementation of alternative revenue mechanisms to ensure the continued maintenance and development of transportation infrastructure.

This white paper addressed the complexities of EV fee strategies, providing a comprehensive analysis of existing and emerging charging units, methodologies for fee computation, and implementation options. It has also offered a detailed overview of the legislative landscape and policy implementation challenges associated with EV fees. Through an in-depth examination of various aspects, including revenue recovery mechanisms, alternative charging mechanisms, and equity considerations, this paper guide policymakers and transportation agencies in navigating the evolving landscape of transportation finance.

One of the key takeaways from this research is the critical need for a balanced approach to EV fee design and implementation. While ensuring that EVs contribute their fair share to the cost of transportation infrastructure is crucial, it is also important to avoid discouraging the adoption of EVs. Striking this balance requires careful consideration of various factors, including revenue

sufficiency, EV adoption incentives, and equity across different vehicle classes and socioeconomic groups.

The analysis of alternative charging mechanisms reveals a diverse range of options, each with its own set of advantages and disadvantages. Annual registration fees, while offering a simple and straightforward approach, may pose a barrier to EV adoption due to the high upfront cost. Mileage-based fees, on the other hand, provide a more equitable usage-based approach but raise concerns about privacy and administrative costs. Electricity excise taxes, while mirroring the familiar pay-at-the-pump mechanism, face challenges in measuring home charging and capturing all charging activities.

The development of the Revenue Recovery Assessment Framework and Tool (RRAT), as part of this research, represents a significant contribution to the field of transportation finance. This tool empowers transportation agencies with the capability to evaluate the fiscal implications of EV adoption and design effective revenue recovery strategies. By incorporating historical data, projecting future scenarios, and analyzing various revenue mechanisms, RRAFT enables informed decision-making and facilitates the development of sustainable funding mechanisms.

This research also underscores the importance of addressing equity concerns in EV fee structures. Fees should be designed in a manner that is fair to all vehicle classes, taking into account factors such as vehicle weight, mileage, and electricity consumption. The legislative landscape surrounding EV fees is dynamic and complex, with numerous bills under consideration in various states. This highlights the growing recognition of the need for alternative funding mechanisms and the diverse approaches being explored. It also underscores the importance of collaboration and knowledge sharing between states and municipalities to accelerate the development of effective and equitable EV fee strategies.

In conclusion, the transition to EVs presents both an opportunity and a challenge for the future of transportation funding. While EVs offer a pathway to a cleaner and more sustainable transportation system, they also disrupt the traditional funding mechanism that has long supported road infrastructure. This necessitates a proactive and innovative approach to revenue generation, one that balances fiscal needs ensuring equity across all vehicle class. The findings and recommendations presented in this white paper provide a roadmap for navigating this complex landscape. By adopting a multifaceted approach to revenue generation, prioritizing equity among vehicle classes and affordability, and promoting transparency, transportation agencies can successfully navigate the transition to EVs while ensuring the continued maintenance and development of critical road infrastructure.

References

AFDC (2024) Alternative Fuels Data Center, U.S. Department of Energy. Alternative fuels data. Retrieved from https://afdc.energy.gov/data

BTS (2024). Bureau of Transportation Statistics. Types of Revenue by Level of Government. U.S. Department of Transportation. https://data.bts.gov/stories/s/p6ng-bqkx/

Chamberlin, R., et al. (2016). Analysis of the Long-term Revenue Impacts of Electric Vehicles in Utah. Utah Department of Transportation. https://www.udot.utah.gov/connect/docs/electric-vehicle-revenue-impacts/

Dumortier, J., Zhang, F., & Marron, J. (2017). State and federal fuel taxes: The road ahead for US infrastructure funding. *Transport Policy*, *53*, 39-49.

Enotrans, Eno Center for Transportation. (2023, July). Driving change: Advice for the national VMT fee pilot. Retrieved from https://enotrans.org/wp-content/uploads/2023/07/Driving-Change-Advice-for-the-National-VMT-Fee-Pilot.pdf

FHWA (2022) Federal Highway Administration. Highway statistics series. U.S. Department of Transportation. Retrieved from https://www.fhwa.dot.gov/policyinformation/statistics.cfm

Harto, C., & Baker-Branstetter, J. (2019). Rising Trend of Punitive Fees on Electric Vehicles Won't Dent State Highway Funding Shortfalls but Will Hurt Consumers. Consumer Reports. https://advocacy.consumerreports.org/research/rising-trend-of-punitive-fees-on-electric-vehicles/

Hauff, K., Pfahl, S., & Degenkolb, R. (2018). Taxation of Electric Vehicles in Europe: A Methodology for Comparison. World Electric Vehicle Journal, 9(2), 30. https://doi.org/10.3390/wevj9020030

IEA (2021). Global EV Outlook 2021: Accelerating ambitions despite the pandemic. https://www.iea.org/reports/global-ev-outlook-2021

Iowa DOT. (2018). Iowa Transportation Funding Study. https://iowadot.gov/transportation-funding-study

Jenn, A., Azevedo, I. L., & Ferreira, P. (2015). The impact of federal incentives on the adoption of hybrid electric vehicles in the United States. Energy Economics, 40, 936-942. https://doi.org/10.1016/j.eneco.2015.01.001

Jia, W., Shen, S., & Safiullah, M. (2019). Fuel tax revenue impacts of electric vehicle adoption in Virginia counties. Transportation Research Record, 2673(4), 548-556. https://doi.org/10.1177/0361198119838274

Jones, K., & Bock, M. (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

Konstantinou, T., Chen, D., Flaris, K., Kang, K., Koo, D. D., Sinton, J., Gkritza, K., & Labi, S. (2022). A strategic assessment of needs and opportunities for the wider adoption of electric vehicles in Indiana (Joint Transportation Research Program Publication No. FHWA/IN/JTRP-2022/12). West Lafayette, IN: Purdue University. https://doi.org/10.5703/1288284317376

LaGuardia, E., Dziczek, K.M., & Mattoon, R.H. (2023). Electric vehicles, motor fuel taxes, and road funding in the Seventh District and beyond. *Economic Perspectives*. No. 2.

Macioszek, E. (2021). Electric Vehicles – The Future of Sustainable Transport. Energies, 14(16), 5023. Retrieved from: https://doi.org/10.3390/en14165023

NASEM (2024). Critical Issues in Transportation for 2024 and Beyond, National Academies of Sciences, Engineering, and Medicine, The National Academies Press. Washington, DC, https://doi.org/10.17226/27432.

NCSL (2024). Special Registration Fees for Electric and Hybrid Vehicles. National Conference of State Legislatures. https://www.ncsl.org/transportation/special-registration-fees-for-electric-and-hybrid-vehicles

Plug In America. (2020). The State of the Evolving Electric Vehicle Market: 2020 Report. https://pluginamerica.org/policy/state-ev-market-report-2020/

Ricciuti, R. (2020). The Impact of Electric Vehicle Adoption on State Highway Revenue. Transportation Research Record.

Short, J., & Crownover, D. (2021). Electric vehicles and infrastructure funding technical memorandum (p. 30). American Transportation Research Institute. https://truckingresearch.org/2021/09/28/electric-vehicles-and-infrastructure-funding-technical-memorandum/

TIAC (2023). State Legislation Monthly Report for July 2023. Transportation Investment Advocacy Center. https://transportationinvestment.org/research/state-legislation/

USDOE (2022). Transportation Energy Data Book, Edition 40, Table 6.2, Energy Vehicle Technologies Office, Oak Ridge National Laboratory, U.S. Department of Energy, https://tedb.ornl.gov/data/.

Vasudevan, V., & Nambisan, S. S. (2014). Impacts of Energy Regulations and Vehicle Technologies on Future Motor Fuel Tax Revenues. Transportation Research Record, 2450(1), 123-132.

Xu, D., Zhou, H., Xue, C., & LaMondia, J. (2020). Impact of electric and hybrid vehicles on highway trust fund in Alabama. Transportation Research Record, 2674(9), 913– 921. https://doi.org/10.1177/0361198120932901

Appendices

APPENDIX 1A – Number of State Motor-Vehicle Registrations: Motorcycles (2015-2022)

State	Growth Rate#	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	1.28%	115,114	109,703	112,185	110,012	107,730	114,901	123,296	125,810
Alaska	0.50%	31,953	31,949	31,859	31,550	28,129	26,781	25,713	25,638
Arizona	2.50%	161,138	166,583	164,055	170,274	160,486	121,074	280,071	279,110
Arkansas	2.50%	91,804	90,838	89,457	91,127	169,796	169,797	175,519	181,434
California	0.50%	828,883	842,106	842,543	822,844	808,377	785,424	812,924	830,000
Colorado	0.50%	191,206	190,592	190,002	190,869	185,875	179,086	180,287	180,103
Connecticut	0.50%	86,531	86,531	90,131	87,660	85,689	80,949	83,220	84,876
Delaware	0.50%	28,179	28,158	27,810	28,071	28,312	23,318	24,338	24,607
Dist. of Col.	0.50%	4,414	4,436	4,290	4,312	4,351	3,567	3,481	4,545
Florida	1.83%	572,754	582,648	586,267	587,499	591,267	620,077	637,448	650,201
Georgia	1.20%	200,410	202,391	203,922	203,968	203,985	207,657	213,700	217,819
Hawaii	0.50%	33,804	31,146	35,576	30,998	39,856	36,980	25,802	25,630
Idaho	0.50%	65,635	65,939	63,297	66,533	66,858	59,225	48,584	63,311
Illinois	0.50%	346,210	314,807	333,943	319,764	314,802	280,322	312,956	291,539
Indiana	0.50%	223,370	223,603	250,579	250,904	252,280	209,824	225,805	216,022
Iowa	0.50%	189,849	192,434	194,603	194,606	192,617	191,804	193,950	195,119
Kansas	0.50%	96,325	96,247	95,892	94,850	92,328	90,643	90,671	89,488
Kentucky	0.50%	111,018	106,648	101,163	101,165	112,177	97,156	99,729	107,212
Louisiana	0.50%	114,076	113,599	113,664	113,664	41,200	101,490	100,058	109,369
Maine	0.50%	54,664	52,374	51,467	51,306	51,666	38,340	59,854	50,061
Maryland	0.50%	126,311	123,936	118,277	118,277	113,195	112,550	104,783	103,607
Massachusetts	0.50%	167,829	167,829	168,931	168,931	162,989	138,123	147,488	146,187
Michigan	0.50%	257,465	256,651	257,455	252,043	253,040	237,481	255,832	256,508
Minnesota	0.50%	248,560	229,377	241,556	241,556	234,786	243,972	223,887	223,875
Mississippi	1.58%	28,329	28,239	28,124	28,262	31,509	30,573	32,649	31,607
Missouri	0.50%	217,731	153,580	138,294	153,905	135,954	126,706	136,058	134,550
Montana	2.50%	197,430	290,295	256,591	293,567	338,845	355,175	377,165	399,881
Nebraska	0.50%	55,935	55,360	55,736	55,736	53,832	50,373	51,153	51,173
Nevada	0.82%	74,526	74,562	76,032	74,740	74,931	69,356	78,064	78,885
New Hampshire	2.40%	73,991	78,218	78,798	78,962	79,167	78,688	85,026	87,365
New Jersey	0.50%	152,472	151,101	152,979	150,528	148,363	121,379	159,602	148,634
New Mexico	0.50%	63,248	61,877	57,718	60,348	60,466	54,946	56,494	56,881
New York	1.62%	354,858	392,771	392,178	389,404	384,622	384,620	390,865	397,212
North Carolina	0.83%	188,922	195,618	188,843	188,484	187,849	189,680	189,314	200,162
North Dakota	2.41%	39,008	39,000	51,941	38,947	38,696	36,234	37,356	46,095
Ohio	0.67%	404,956	408,114	410,187	409,893	406,543	380,617	414,401	424,385
Oklahoma	2.38%	129,093	135,937	136,190	129,451	129,448	133,895	175,374	152,178
Oregon	1.39%	128,308	136,238	142,738	133,760	134,899	123,617	134,213	141,277
Pennsylvania	0.50%	393,390	393,037	377,158	372,679	366,641	360,493	372,063	371,946
Rhode Island	0.50%	31,751	31,137	30,914	28,267	24,175	23,607	24,833	24,591
South Carolina	0.76%	116,241	118,105	118,132	116,972	116,510	114,514	119,548	122,547
South Dakota	2.50%	95,919	114,742	117,461	120,494	124,037	129,769	136,341	140,761
Tennessee	2.50%	166,260	167,961	165,968	181,126	184,889	177,270	195,328	199,360
Texas	0.50%	387,149	374,919	364,690	349,082	351,367	328,300	343,292	342,485
Utah	2.50%	78,833	82,623	83,993	84,413	105,909	123,924	130,910	142,921
Vermont	1.21%	31,051	30,976	30,955	30,532	30,404	28,942	31,445	33,775
Virginia	0.50%	192,840	191,820	193,951	195,845	193,813	184,441	188,100	191,968
Washington	0.50%	236,385	236,135	231,401	235,501	232,371	221,448	245,409	226,056
West Virginia	0.50%	58,766	61,090	60,582	60,683	46,763	43,529	47,636	48,457
Wisconsin	0.50%	325,032	335,359	324,670	336,410	283,874	276,310	323,974	280,182
Wyoming	0.50%	31,010	30,041	28,960	28,968	28,644	28,488	29,015	28,655

- Growth Rate (GR) is computed by the author to model future projections, with adjustments made to constrain the range between 0.5% and 2.50%. Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1B – Number of State Motor-Vehicle Registrations: Light Duty Vehicles (2015-2022)

State	Growth Rate[#]	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	0.50%	5,093,870	5,088,814	4,690,348	4,932,833	4,921,591	4,946,626	5,078,806	5,115,767
Alaska	0.50%	714,169	677,939	704,607	711,311	707,736	702,485	674,563	669,907
Arizona	1.76%	5,068,315	5,214,282	5,495,236	5,383,091	5,568,568	5,689,420	5,658,994	5,726,890
Arkansas	0.67%	2,515,280	2,548,565	2,558,428	2,525,662	2,531,815	2,537,618	2,644,077	2,634,898
California	0.73%	27,087,458	27,793,621	28,256,570	28,431,910	28,671,554	28,282,316	28,660,439	28,505,884
Colorado	1.46%	4,580,710	4,666,312	4,814,106	4,908,860	4,967,406	4,994,026	4,985,261	5,070,189
Connecticut	0.50%	2,656,275	2,656,328	2,637,870	2,692,276	2,693,553	2,687,455	2,640,579	2,668,424
Delaware	0.50%	902,459	934,946	908,707	947,526	955,591	966,458	747,575	759,354
Dist. of Col.	1.79%	298,289	306,887	320,100	322,329	322,119	334,449	329,489	337,833
Florida	2.50%	14,920,953	15,335,371	15,679,879	16,187,071	16,516,963	16,935,766	17,386,812	17,755,976
Georgia	1.21%	7,521,654	7,621,152	7,793,036	7,843,928	7,921,338	8,030,025	8,147,475	8,181,115
Hawaii	0.50%	1,168,730	1,155,280	1,180,724	1,193,801	1,191,277	1,179,366	1,180,574	1,174,346
Idaho	0.91%	1,681,207	1,652,551	1,647,593	1,683,411	1,757,500	1,770,297	1,779,116	1,791,614
Illinois	0.50%	9,745,662	9,437,387	9,946,025	9,598,213	9,708,822	9,656,881	9,724,286	9,450,871
Indiana	0.50%	5,294,105	5,375,439	5,360,435	5,373,760	5,402,845	5,408,710	5,419,055	5,418,793
Iowa	0.50%	3,225,826	3,233,467	3,277,929	3,196,425	3,291,912	3,278,768	3,290,002	3,273,399
Kansas	0.50%	2,369,187	2,391,859	2,425,366	2,366,421	2,367,766	2,320,776	2,299,843	2,280,596
Kentucky	0.73%	3,830,401	3,890,136	3,955,389	4,020,123	4,024,257	4,063,340	4,051,757	4,030,374
Louisiana	0.50%	3,568,141	3,562,934	3,558,142	3,530,756	3,521,633	3,498,320	3,472,899	3,690,488
Maine	0.68%	989,051	993,432	970,099	991,618	995,610	991,616	1,065,363	1,036,939
Maryland	1.43%	3,823,602	3,863,623	4,047,744	3,896,877	3,901,654	3,910,387	4,218,845	4,224,334
Massachusetts	0.50%	4,720,158	4,701,679	4,727,164	4,724,386	4,730,670	4,725,048	4,784,191	4,785,094
Michigan	0.85%	7,719,116	7,749,281	7,895,183	7,729,397	7,788,230	7,815,135	8,190,565	8,190,899
Minnesota	0.60%	4,752,534	4,823,258	5,108,792	4,806,047	4,833,037	4,924,718	4,902,363	4,954,307
Mississippi	0.50%	1,935,570	1,948,904	1,900,583	1,880,061	1,876,689	1,854,655	1,955,450	1,894,619
Missouri	0.50%	5,106,537	5,204,140	5,084,305	4,981,452	5,035,192	5,012,229	4,976,295	4,861,602
Montana	2.36%	1,329,265	1,367,326	1,433,098	1,430,048	1,440,900	1,489,972	1,524,497	1,565,496
Nebraska	0.50%	1,757,407	1,726,442	1,689,323	1,649,495	1,656,738	1,612,498	1,585,260	1,567,929
Nevada	2.21%	2,156,876	2,227,829	2,294,558	2,357,797	2,390,481	2,410,338	2,489,130	2,514,051
New Hampshire	1.12%	1,165,801	1,180,853	1,179,201	1,204,147	1,220,781	1,220,048	1,246,076	1,260,648
New Jersey	0.50%	5,473,231	5,503,077	5,606,386	5,599,813	5,579,738	5,586,848	5,689,983	5,618,308
New Mexico	0.50%	1,650,446	1,645,200	1,566,921	1,650,957	1,653,689	1,643,280	1,646,544	1,638,516
New York	0.50%	9,846,472	10,225,475	9,982,285	10,605,268	10,524,337	10,624,383	9,831,333	10,032,010
North Carolina	1.43%	7,346,866	7,662,799	7,427,696	7,533,888	7,850,719	7,951,752	7,975,155	8,116,514
North Dakota	0.50%	740,739	742,022	872,342	720,126	723,689	710,831	707,838	734,707
Ohio	0.50%	9,646,645	9,737,735	9,829,910	9,903,576	9,893,725	9,868,781	9,862,058	9,920,711
Oklahoma	2.50%	2,597,606	3,370,119	3,366,474	3,316,280	3,322,566	3,317,440	3,176,449	3,176,527
Oregon	2.06%	3,260,040	3,441,143	3,736,582	3,586,522	3,562,759	3,664,448	3,669,798	3,760,665
Pennsylvania	0.50%	9,651,864	9,772,982	9,678,411	9,676,035	9,755,720	9,668,937	9,683,558	9,648,997
Rhode Island	0.50%	811,772	810,079	809,476	812,022	812,654	811,953	783,052	786,522
South Carolina	2.14%	3,827,919	3,952,841	4,005,059	4,052,322	4,104,033	4,139,826	4,363,804	4,440,128
South Dakota	2.50%	889,100	1,019,545	1,022,863	1,023,995	1,031,458	1,050,012	1,081,056	1,111,034
Tennessee	1.92%	5,146,488	5,259,591	5,396,547	5,373,325	5,415,388	5,454,919	5,798,648	5,880,739
Texas	0.99%	20,337,317	20,187,063	20,567,010	20,622,798	21,429,840	21,531,153	21,562,187	21,795,710
Utah	2.50%	2,014,823	2,106,422	2,150,305	2,169,304	2,205,039	2,237,829	2,379,660	2,410,592
Vermont	0.50%	591,261	545,733	551,283	547,719	549,011	536,800	524,426	518,467
Virginia	1.11%	6,739,822	6,786,114	6,998,048	7,082,786	7,130,047	7,128,473	7,181,977	7,278,915
Washington	2.22%	6,104,088	6,385,054	6,621,400	6,535,790	6,756,390	6,764,154	7,098,171	7,117,206
West Virginia	0.63%	1,469,484	1,546,827	1,536,313	1,538,583	1,527,640	1,522,888	1,397,430	1,535,980
Wisconsin	0.66%	4,850,069	4,914,876	4,942,578	5,003,894	5,037,687	5,036,318	5,064,777	5,077,306
Wyoming	0.90%	722,117	732,203	717,547	742,694	750,131	755,359	760,909	768,922

- Growth Rate (GR) is computed by the author to model future projections, with adjustments made to constrain the range between 0.5% and 2.50%.
Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1C – Number of State Motor-Vehicle Registrations: Buses (2015-2022)

State	Growth Rate#	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	0.5%	5,727	6,238	5,682	5,767	5,592	5,624	5,650	5,800
Alaska	0.7%	3,441	8,119	8,080	8,473	8,645	8,620	7,835	8,462
Arizona	0.5%	21,049	9,016	9,051	8,349	8,407	8,486	21,356	21,364
Arkansas	0.5%	11,813	11,931	11,941	12,006	12,032	12,044	11,334	10,840
California	0.5%	94,020	98,622	99,917	99,692	100,526	100,828	94,889	95,965
Colorado	0.5%	12,666	12,771	13,305	13,303	13,485	13,720	13,041	12,877
Connecticut	0.5%	12,725	12,587	11,378	11,753	11,729	11,773	10,222	9,975
Delaware	0.5%	4,365	4,288	3,763	3,802	3,830	3,859	3,571	3,437
Dist. of Col.	2.5%	4,569	4,682	4,885	5,088	5,403	5,133	6,287	6,637
Florida	0.5%	60,125	59,808	59,596	59,557	59,235	60,173	59,851	59,773
Georgia	0.5%	42,542	37,487	36,418	36,314	36,871	36,902	37,412	38,071
Hawaii	0.5%	2,899	3,069	3,033	2,936	2,882	2,885	2,882	2,879
Idaho	2.5%	3,278	3,877	3,870	3,809	3,870	3,938	4,085	4,238
Illinois	2.2%	34,773	34,936	34,359	34,649	34,670	34,323	37,535	40,629
Indiana	0.5%	21,805	20,727	20,725	20,937	21,195	20,870	20,688	20,507
Iowa	0.5%	9,186	9,174	9,284	9,357	9,431	9,173	9,368	8,935
Kansas	2.5%	3,918	5,575	6,228	6,592	6,572	6,601	7,327	8,133
Kentucky	0.5%	10,480	10,559	10,759	11,006	10,803	10,988	10,916	10,837
Louisiana	2.3%	28,961	29,188	29,160	29,527	29,461	30,083	31,681	34,044
Maine	0.7%	4,455	4,349	4,339	4,601	4,598	4,623	4,657	4,692
Maryland	2.5%	13,238	22,801	22,972	23,050	23,056	23,407	15,827	15,890
Massachusetts	2.5%	11,784	11,779	13,498	13,747	13,751	13,752	14,246	14,818
Michigan	0.7%	8,649	8,656	8,737	8,882	8,945	8,942	9,002	9,062
Minnesota	0.5%	19,244	19,179	19,980	20,340	20,039	19,192	19,182	19,171
Mississippi	1.4%	8,049	8,088	8,018	7,451	7,429	7,386	9,346	8,852
Missouri	2.5%	16,885	27,569	27,180	27,165	27,220	33,750	22,179	22,339
Montana	1.8%	4,584	4,634	4,702	4,999	5,114	5,195	5,138	5,204
Nebraska	0.5%	3,945	13,452	13,564	13,540	13,605	13,656	13,708	13,760
Nevada	0.5%	3,128	3,128	3,198	4,255	4,298	4,266	4,272	4,277
New Hampshire	1.5%	2,822	2,798	2,871	3,045	3,096	3,080	2,423	3,131
New Jersey	0.5%	24,360	25,049	25,097	25,870	26,021	25,958	26,622	24,168
New Mexico	1.2%	6,239	6,283	6,278	5,523	5,543	9,791	6,735	6,795
New York	0.5%	30,620	80,780	80,446	82,848	81,821	81,682	83,317	82,755
North Carolina	0.5%	31,770	32,525	32,493	32,296	32,097	33,332	32,318	32,810
North Dakota	2.5%	2,819	2,835	3,331	3,422	3,503	3,663	3,363	3,517
Ohio	0.5%	36,946	40,844	41,255	41,512	41,612	41,482	35,045	34,120
Oklahoma	0.5%	3,205	3,171	3,155	2,859	2,857	2,841	2,773	2,707
Oregon	1.2%	16,004	17,069	17,691	17,611	17,654	17,841	16,861	17,384
Pennsylvania	0.5%	55,117	55,848	55,935	56,086	56,336	55,267	54,569	54,868
Rhode Island	0.5%	2,177	2,285	2,273	2,270	2,245	2,277	2,177	2,208
South Carolina	0.5%	17,690	17,713	17,728	17,322	17,652	16,466	16,372	16,101
South Dakota	0.5%	2,840	2,339	2,614	2,654	2,658	2,669	2,636	2,604
Tennessee	0.5%	26,208	28,042	29,158	29,610	29,569	29,560	22,040	22,480
Texas	1.2%	66,980	66,697	67,143	69,966	70,091	70,931	73,463	72,630
Utah	2.5%	5,985	5,986	6,109	6,419	6,591	6,421	7,443	7,684
Vermont	0.5%	1,170	1,092	1,070	1,122	1,090	1,386	1,370	1,104
Virginia	1.2%	32,999	33,207	34,268	34,801	35,080	35,463	35,683	35,959
Washington	0.9%	21,823	23,055	23,566	23,846	24,563	24,172	23,166	23,226
West Virginia	0.5%	3,281	3,324	3,342	3,172	3,186	3,155	3,130	3,106
Wisconsin	0.5%	14,095	14,712	15,567	14,892	14,973	14,941	13,849	13,540
Wyoming	0.5%	1,454	4,218	4,219	4,058	4,101	4,101	4,072	4,044

- Growth Rate (GR) is computed by the author to model future projections, with adjustments made to constrain the range between 0.5% and 2.50%. Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1D – Number of State Motor-Vehicle Registrations: Trucks (2015-2022)

State	Growth Rate#	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	2.41%	185,708	263,546	247,858	251,588	253,296	253,189	274,511	219,410
Alaska	0.50%	65,559	76,607	59,959	52,349	50,765	54,940	53,032	51,191
Arizona	0.50%	380,145	397,010	296,092	244,599	245,098	234,801	230,051	225,396
Arkansas	2.50%	153,317	156,804	173,871	188,350	188,469	193,910	203,236	213,012
California	2.50%	1,413,651	1,486,684	1,596,111	1,667,882	1,666,812	1,229,681	1,780,821	1,714,764
Colorado	2.50%	220,590	246,666	242,547	242,986	245,637	252,331	259,208	266,272
Connecticut	0.50%	86,233	86,396	86,971	88,113	87,577	87,377	87,608	87,839
Delaware	1.64%	29,313	36,448	30,453	29,069	29,194	31,795	32,316	32,845
Dist. of Col.	2.50%	15,657	21,095	16,741	20,203	18,590	19,405	20,257	21,145
Florida	2.50%	551,176	622,490	633,527	661,874	666,254	698,598	732,512	768,072
Georgia	2.50%	373,015	378,749	408,949	428,340	432,373	448,633	465,505	483,011
Hawaii	1.67%	36,886	42,233	40,208	39,651	38,345	25,704	27,208	41,434
Idaho	2.50%	103,899	119,878	121,143	125,917	126,300	132,618	139,251	146,217
Illinois	2.35%	468,609	490,052	576,433	636,284	633,653	617,713	928,952	551,396
Indiana	2.50%	505,834	520,761	538,295	545,135	547,140	560,497	593,125	618,359
Iowa	2.50%	212,037	241,215	268,261	291,503	292,368	307,479	345,992	301,969
Kansas	2.50%	165,426	156,055	190,387	216,147	215,671	185,523	213,941	216,520
Kentucky	2.50%	200,083	217,445	225,894	235,991	235,985	288,201	246,328	255,014
Louisiana	2.50%	190,254	199,241	205,846	211,172	210,452	231,311	257,852	271,254
Maine	2.50%	55,831	57,519	68,483	78,063	78,181	86,527	94,451	103,100
Maryland	0.50%	172,007	168,513	168,605	166,642	166,089	165,900	164,705	163,519
Massachusetts	2.50%	169,830	188,272	155,628	154,434	153,849	159,763	261,127	238,351
Michigan	2.50%	308,878	318,307	355,690	390,065	389,850	391,681	410,735	430,716
Minnesota	2.50%	260,931	286,503	312,325	336,333	338,022	360,620	384,729	410,450
Mississippi	2.00%	96,905	81,991	120,751	151,724	151,054	166,361	388,323	363,851
Missouri	2.50%	282,852	299,236	318,957	336,153	335,923	414,337	469,407	355,231
Montana	0.50%	113,948	132,477	119,463	116,724	115,946	102,211	233,214	278,904
Nebraska	2.50%	164,009	156,512	206,482	242,538	244,304	255,197	288,427	339,245
Nevada	0.50%	81,526	93,140	81,654	77,547	76,873	66,454	108,640	72,646
New Hampshire	0.81%	53,523	60,813	58,247	60,164	60,335	55,719	56,169	56,623
New Jersey	0.50%	288,522	261,770	273,249	279,178	278,892	272,062	268,885	265,744
New Mexico	0.53%	103,512	110,601	109,085	107,389	105,724	106,284	106,847	107,413
New York	0.50%	406,815	423,366	402,546	404,709	398,379	396,297	394,226	392,166
North Carolina	2.50%	361,415	379,701	421,685	455,544	456,723	484,244	513,424	544,362
North Dakota	2.50%	108,237	111,097	129,144	137,458	137,780	148,355	155,373	162,724
Ohio	2.50%	468,776	499,364	527,895	558,792	559,399	301,437	580,873	649,539
Oklahoma	1.32%	258,608	228,178	238,359	250,432	251,754	276,071	279,703	283,382
Oregon	1.15%	203,130	217,256	206,440	204,982	203,845	289,536	189,763	220,007
Pennsylvania	2.50%	498,323	526,955	577,702	622,915	621,619	605,490	626,888	649,043
Rhode Island	0.50%	29,397	32,727	30,151	29,785	29,868	28,747	28,618	28,490
South Carolina	2.50%	200,801	235,764	263,181	270,903	277,947	290,493	306,055	322,451
South Dakota	0.50%	94,430	109,733	115,418	122,271	122,816	111,832	107,577	90,244
Tennessee	0.50%	273,167	254,329	208,816	186,813	188,041	193,624	180,745	168,722
Texas	0.50%	1,073,395	1,137,487	1,131,922	1,144,395	1,155,848	489,106	1,034,048	1,080,813
Utah	0.50%	129,552	122,251	115,366	112,664	112,737	111,430	108,121	104,911
Vermont	2.50%	31,865	38,149	38,300	40,321	39,924	41,069	43,207	45,456
Virginia	0.50%	273,244	289,940	288,217	291,214	288,752	258,075	246,276	256,445
Washington	2.50%	363,171	403,445	379,829	357,277	363,703	247,627	599,401	468,575
West Virginia	1.42%	81,814	93,584	91,000	91,282	90,525	87,790	89,037	90,301
Wisconsin	1.63%	277,385	299,482	313,820	327,865	329,865	288,702	366,458	310,645
Wyoming	2.50%	60,408	88,768	68,531	61,304	60,795	73,080	75,917	78,864

- Growth Rate (GR) is computed by the author to model future projections, with adjustments made to constrain the range between 0.5% and 2.50%.
Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1E – State Gas Tax (2015-2022) (Cents/gallon)

State	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	18	18	18	18	26	26	26	30
Alaska	8	8	8	8	8	8	8	8
Arizona	18	18	18	18	18	18	18	18
Arkansas	21.5	21.5	21.5	21.5	24.8	24.8	24.8	24.8
California	30	30	42	42	47	51	51	54
Colorado	22	22	22	22	22	22	24	24
Connecticut	25	25	25	25	25	25	25	25
Delaware	23	23	23	23	23	23	23	23
Dist. of Col.	24	24	24	24	24	24	24	24
Florida	17	17	17	28	37	38	38	39
Georgia	26	26	26	27	28	28	29	29
Hawaii	17	16	16	16	16	16	16	16
Idaho	32	33	33	33	33	33	33	33
Illinois	19	19	19	19	39	40	40	40
Indiana	18	18	29	30	31	32	33	34
Iowa	30.8	31.7	31.5	31.7	31.5	31	31	31
Kansas	24	24	24	24	24	24	24	24
Kentucky	25	25	25	25	25	25	25	25
Louisiana	20	20	20	20	20	20	20	20
Maine	30	30	30	30	30	30	30	30
Maryland	32	34	34	35	37	36	36	43
Massachusetts	24	24	24	24	24	24	24	24
Michigan	19	19	26	26	26	26	26	27
Minnesota	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5
Mississippi	18	18	18	18	18	18	18	18
Missouri	17	17	17	17	17	17	20	22
Montana	28	28	32	32	33	33	33	33
Nebraska	26.1	26.7	27.9	28.9	30.6	34.1	28.6	25.7
Nevada	24	24	24	24	24	24	24	24
New Hampshire	24	24	24	24	24	24	24	24
New Jersey	11	38	37	37	37	37	37	37
New Mexico	17	17	17	17	17	17	17	17
New York	26	25	24	25	26	25	25	25
North Carolina	36	34	35	35	36	36	36	39
North Dakota	23	23	23	23	23	23	23	23
Ohio	28	28	28	28	39	39	39	39
Oklahoma	17	17	17	20	20	20	20	20
Oregon	30	30	30	34	34	36	36	38
Pennsylvania	51	50	58	58	58	58	58	58
Rhode Island	33	33	33	34	35	35	35	35
South Carolina	16	16	18	20	22	24	26	28
South Dakota	28	28	30	30	30	30	30	30
Tennessee	20	20	24	25	26	26	26	26
Texas	20	20	20	20	20	20	20	20
Utah	25	29	29	29	30	30	30	30
Vermont	19	31	31	30	30	30	30	30
Virginia	16	16	16	16	16	16	26	28
Washington	44.5	49.4	49.4	49.4	49.4	49.4	49.4	49.4
West Virginia	34.6	33.2	35.7	35.7	35.7	35.7	35.7	35.7
Wisconsin	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
Wyoming	24	24	24	24	24	24	24	24

- Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1F – State Special Fuel Tax (2015-2022) (Cents/gallon)

State	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	19	19	21	21	27	27	29	31
Alaska	8	8	8	8	8	8	8	8
Arizona	26	26	26	26	26	26	26	26
Arkansas	22.5	22.5	22.5	22.5	28.8	28.8	28.8	28.4
California	13	13	36	36	36	39	39	41
Colorado	21	21	21	21	21	21	22	22
Connecticut	55	50	42	42	47	47	40	49
Delaware	22	22	22	22	22	22	22	22
Dist. of Col.	24	24	24	24	24	24	24	24
Florida	17	17	27	28	37	38	38	39
Georgia	29	29	29	30	31	31	32	33
Hawaii	17	16	16	16	16	16	16	16
Idaho	32	32	33	33	33	33	33	33
Illinois	22	22	22	22	47	47	48	48
Indiana	16	16	27	49	50	52	54	56
Iowa	32.5	32.5	33.5	33.5	33.5	33.5	33.5	33.5
Kansas	26	26	26	26	26	26	26	26
Kentucky	22	22	22	22	22	22	22	22
Louisiana	20	20	20	20	20	20	20	20
Maine	31.2	31.2	31.2	31.2	31.2	31.2	31.2	31.2
Maryland	33	33	35	36	37	37	37	43
Massachusetts	24	24	24	24	24	24	24	24
Michigan	15	15	26	26	26	26	26	27
Minnesota	28.5	28.5	28.5	28.5	28.5	28.5	28.5	28.5
Mississippi	18	18	18	18	18	18	18	18
Missouri	17	17	17	17	17	17	20	22
Montana	29	29	30	30	30	30	30	30
Nebraska	26.1	27.7	27.9	28.9	30.6	34.1	28.6	25.7
Nevada	27	27	27	27	27	27	28	28
New Hampshire	24	24	24	24	24	24	24	24
New Jersey	14	14	40	40	40	40	40	40
New Mexico	21	21	21	21	21	21	21	21
New York	24	24	22	23	24	24	23	24
North Carolina	36	35	35	35	36	36	36	39
North Dakota	23	23	23	23	23	23	23	23
Ohio	28	28	28	28	47	47	47	47
Oklahoma	14	14	14	20	20	20	20	20
Oregon	30	30	30	34	34	36	36	38
Pennsylvania	64	64	75	74	74	74	74	74
Rhode Island	33	33	33	34	35	35	35	35
South Carolina	16	16	18	20	22	24	26	28
South Dakota	28	28	30	30	30	30	30	30
Tennessee	17	17	21	24	27	27	27	27
Texas	20	20	20	20	20	20	20	20
Utah	25	29	29	29	30	30	30	30
Vermont	31	31	31	31	31	31	31	31
Virginia	20	20	20	20	20	20	27	29
Washington	44.5	44.5	49.4	49.4	49.4	49.4	49.4	49.4
West Virginia	34.6	33.2	35.7	35.7	35.7	35.7	35.7	35.7
Wisconsin	30.9	30.9	30.9	30.9	30.9	30.9	30.9	30.9
Wyoming	24	24	24	24	24	24	24	24

Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1G – Annual Vehicle Miles Traveled (VMT) (2015-2022) (in millions)

State	Growth Rate#	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	0.90%	67,257	69,227	70,677	71,167	71,735	67,921	71,892	71,631
Alaska	1.18%	5,045	5,259	5,519	5,487	5,881	5,306	5,752	5,478
Arizona	2.28%	65,045	65,786	65,070	66,145	70,281	65,758	73,760	76,159
Arkansas	1.42%	34,897	35,755	36,389	36,675	37,099	33,919	38,427	38,530
California	0.50%	335,539	340,115	343,862	348,796	340,836	299,812	310,823	315,244
Colorado	0.96%	50,437	52,152	53,382	53,954	54,634	48,642	53,840	53,935
Connecticut	0.50%	31,592	31,639	31,500	31,596	31,601	29,845	28,989	29,666
Delaware	0.50%	9,931	10,178	10,467	10,179	10,245	8,345	10,152	9,872
Dist. of Col.	0.50%	3,557	3,622	3,716	3,691	3,756	3,030	3,248	3,421
Florida	1.38%	206,982	215,551	218,826	221,816	226,514	208,076	217,566	227,757
Georgia	1.25%	118,107	122,802	124,733	131,456	133,128	115,967	120,685	128,871
Hawaii	0.50%	10,301	10,635	10,749	10,887	11,024	8,785	9,972	10,289
Idaho	2.01%	16,662	17,199	17,300	17,709	18,058	17,406	19,308	19,157
Illinois	0.50%	105,223	107,314	108,011	107,954	107,525	94,121	97,530	103,752
Indiana	1.05%	78,819	83,183	81,752	81,529	82,719	76,608	78,640	84,787
Iowa	0.50%	33,161	33,337	33,482	33,282	33,537	29,751	33,039	32,712
Kansas	0.50%	31,379	32,103	32,258	32,190	31,843	27,854	31,693	31,334
Kentucky	0.50%	48,675	49,313	49,239	49,544	49,410	46,536	48,111	48,047
Louisiana	2.31%	48,180	49,156	49,221	50,045	51,360	48,374	54,728	56,514
Maine	0.50%	14,629	14,838	14,738	14,784	14,871	13,086	14,560	14,651
Maryland	0.50%	57,516	59,137	60,045	59,775	60,216	50,885	56,601	56,746
Massachusetts	0.50%	59,257	61,825	62,660	66,772	64,890	54,127	59,115	56,949
Michigan	0.50%	97,843	99,433	101,757	102,398	102,174	86,547	96,744	95,901
Minnesota	0.50%	57,395	59,029	59,971	60,438	60,731	51,619	57,171	57,471
Mississippi	0.50%	39,890	40,755	40,877	40,730	41,091	39,665	40,853	39,952
Missouri	1.43%	71,918	74,019	75,911	76,595	79,168	72,797	79,791	79,431
Montana	1.30%	12,345	12,599	12,645	12,700	12,892	12,104	13,482	13,514
Nebraska	0.81%	20,101	20,700	21,002	20,975	21,242	19,432	21,210	21,270
Nevada	0.92%	25,925	26,788	27,587	28,319	28,794	25,231	27,077	27,647
New Hampshire	0.50%	13,094	13,513	13,681	13,776	13,828	11,956	13,130	13,281
New Jersey	0.50%	75,393	77,093	77,509	77,539	78,205	66,341	73,673	75,288
New Mexico	0.50%	27,435	27,886	27,836	27,288	27,772	23,756	26,823	26,831
New York	0.50%	121,699	122,337	123,477	123,510	123,986	102,477	106,870	115,382
North Carolina	0.93%	111,879	116,749	119,176	121,127	122,475	106,342	117,734	119,381
North Dakota	0.50%	10,036	9,739	9,717	9,856	9,826	8,768	9,256	9,180
Ohio	0.50%	113,673	118,608	119,598	114,474	114,694	103,115	112,923	110,578
Oklahoma	0.50%	47,713	49,013	49,402	45,433	44,648	42,000	44,760	44,566
Oregon	0.50%	35,999	36,719	36,753	36,848	35,808	32,298	36,842	36,576
Pennsylvania	0.50%	100,945	101,362	101,614	102,109	102,864	87,982	102,686	99,912
Rhode Island	0.50%	7,833	7,927	8,001	8,009	7,581	6,864	7,526	7,531
South Carolina	1.89%	51,726	54,553	55,497	56,801	57,939	53,972	57,492	58,988
South Dakota	1.25%	9,324	9,507	9,643	9,719	9,922	9,743	9,994	10,170
Tennessee	1.18%	76,670	76,884	82,253	81,321	82,892	76,392	82,596	83,219
Texas	1.72%	258,122	271,263	272,981	282,037	288,227	260,582	285,028	290,890
Utah	2.14%	29,604	31,449	31,475	32,069	32,911	30,251	33,638	34,336
Vermont	0.50%	7,314	7,382	7,424	7,346	7,346	6,007	6,625	7,128
Virginia	0.50%	82,625	84,463	85,263	85,336	85,432	76,110	80,102	82,083
Washington	0.50%	59,653	61,018	61,420	62,367	62,530	53,658	57,797	58,483
West Virginia	0.50%	19,827	19,539	19,072	19,447	19,077	16,054	16,079	15,312
Wisconsin	0.92%	62,073	64,046	65,324	65,885	66,348	57,600	64,983	66,167
Wyoming	0.50%	9,597	9,323	9,785	10,438	10,208	9,800	11,097	9,324

- Growth Rate (GR) is computed by the author to model future projections, with adjustments made to constrain the range between 0.5% and 2.50%. Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1H – Distribution (in %) of Annual Vehicle Distance Traveled

State	2016	2017	2018	2019
Alabama	0.9	87.1	0.5	11.5
Alaska	0.6	89.4	0.3	9.7
Arizona	0.8	82.8	1.0	15.4
Arkansas	0.6	82.2	0.8	16.4
California	2.5	83.1	1.0	13.4
Colorado	0.7	91.2	0.4	7.7
Connecticut	0.4	90.1	0.8	8.7
Delaware	0.9	85.5	1.5	12.1
Dist. of Col.	0.4	96.2	1.1	2.3
Florida	0.5	87.9	0.6	11.1
Georgia	0.4	85.5	0.6	13.5
Hawaii	0.2	93.0	0.4	6.4
Idaho	0.6	87.2	0.3	11.9
Illinois	0.8	84.3	0.7	14.2
Indiana	0.5	83.0	0.4	16.1
Iowa	0.1	85.3	0.3	14.3
Kansas	0.4	86.7	0.1	12.8
Kentucky	0.6	83.4	0.9	15.2
Louisiana	0.8	85.5	0.5	13.2
Maine	1.6	88.2	0.8	9.5
Maryland	0.4	91.9	0.3	7.4
Massachusetts	0.9	90.7	0.7	7.7
Michigan	0.4	91.0	0.2	8.4
Minnesota	0.4	86.9	0.8	11.9
Mississippi	0.2	85.6	0.6	13.7
Missouri	0.9	83.5	0.7	14.9
Montana	0.6	88.4	0.6	10.5
Nebraska	0.2	88.3	0.2	11.3
Nevada	0.9	84.3	0.6	14.2
New Hampshire	1.1	92.1	0.6	6.1
New Jersey	0.3	90.6	0.3	8.8
New Mexico	1.5	87.5	0.9	10.1
New York	0.4	89.5	0.8	9.3
North Carolina	0.5	90.7	0.6	8.2
North Dakota	0.2	83.8	0.5	15.5
Ohio	0.6	87.9	0.6	11.0
Oklahoma	0.4	85.4	0.6	13.5
Oregon	0.7	84.7	0.8	13.8
Pennsylvania	0.9	86.7	0.8	11.7
Rhode Island	0.7	93.9	0.5	4.9
South Carolina	0.3	92.4	0.1	7.1
South Dakota	0.4	90.0	0.3	9.3
Tennessee	1.4	86.9	0.1	11.7
Texas	0.5	86.4	0.1	13.0
Utah	0.2	83.6	0.3	16.0
Vermont	0.6	76.6	0.5	22.3
Virginia	1.1	90.9	0.7	7.3
Washington	0.3	91.3	0.6	7.8
West Virginia	0.3	88.8	0.3	10.6
Wisconsin	0.5	85.1	0.9	13.5
Wyoming	0.3	87.2	0.8	11.7

Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

. APPENDIX 1I – Fuel Tax Revenues Collected (2015-2022) (in 1'000s of Dollars)

State	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	667,032	669,581	671,594	643,630	654,210	813,913	919,629	941,737
Alaska	31,995	29,588	29,255	30,876	29,926	29,331	28,236	30,038
Arizona	657,060	689,094	717,810	718,980	741,654	725,028	746,933	798,323
Arkansas	436,534	485,699	472,507	482,257	485,531	531,992	577,438	587,596
California	5,485,418	4,808,950	4,587,287	6,153,281	7,284,657	7,383,250	7,449,375	8,461,712
Colorado	605,935	648,901	669,697	681,991	673,191	629,047	659,176	634,782
Connecticut	869,078	745,997	719,276	798,819	787,214	644,496	719,108	720,635
Delaware	116,707	124,423	129,323	131,124	142,620	136,321	124,718	133,608
Dist. of Col.	25,256	25,332	26,099	135,147	81,296	22,472	23,397	22,895
Florida	2,451,544	2,586,451	2,685,312	2,750,083	2,858,261	2,809,251	2,749,464	3,056,479
Georgia	1,025,511	1,604,569	1,740,266	1,801,246	1,837,817	1,873,111	1,781,558	1,819,233
Hawaii	83,804	84,963	81,674	82,454	81,664	75,603	66,296	76,080
Idaho	238,295	309,008	324,096	334,815	345,463	344,359	367,599	398,348
Illinois	1,215,423	1,259,512	1,250,886	1,267,720	1,237,294	2,269,354	2,311,825	2,491,107
Indiana	828,108	837,279	848,243	825,647	1,834,471	1,527,191	1,568,910	1,796,492
Iowa	491,404	656,146	704,975	637,460	651,264	693,765	658,502	706,421
Kansas	446,873	453,983	447,517	465,470	470,273	436,954	454,789	463,413
Kentucky	849,357	748,125	758,594	763,207	771,441	739,789	746,432	787,839
Louisiana	594,767	616,107	628,690	597,779	604,167	549,390	612,213	621,273
Maine	243,011	244,102	251,946	249,561	250,364	236,746	226,677	246,669
Maryland	910,730	995,999	1,062,963	1,068,435	1,117,270	1,061,881	1,011,571	1,140,984
Massachusetts	755,379	765,845	764,155	769,356	774,800	707,211	662,341	724,184
Michigan	986,656	993,235	1,341,850	1,443,508	1,435,824	1,296,666	1,331,785	1,380,253
Minnesota	878,742	912,074	923,230	941,975	922,191	854,273	850,181	914,073
Mississippi	398,193	433,085	424,873	413,429	423,347	411,993	428,192	439,306
Missouri	680,425	697,908	699,777	706,268	706,934	693,050	673,987	737,590
Montana	210,074	208,393	192,502	243,829	241,874	240,406	253,906	275,732
Nebraska	332,011	349,136	356,653	373,664	391,463	397,812	420,495	386,996
Nevada	579,020	624,267	665,430	701,182	730,510	697,672	734,185	777,624
New Hampshire	179,973	183,971	184,900	186,748	189,724	178,042	170,469	182,307
New Jersey	542,390	559,995	544,629	535,110	528,643	468,979	459,964	489,231
New Mexico	284,356	284,424	290,423	305,017	313,019	152,244	321,752	306,526
New York	1,653,846	1,639,356	1,653,386	1,604,353	1,705,415	1,685,833	1,692,304	1,698,800
North Carolina	1,912,799	1,924,451	1,913,653	1,963,046	2,090,689	1,934,446	2,103,273	2,325,661
North Dakota	207,119	195,355	189,564	194,073	197,809	190,769	171,781	167,012
Ohio	1,819,167	1,837,287	1,871,208	1,861,083	1,860,600	2,488,476	2,551,258	2,668,508
Oklahoma	455,267	137,731	161,286	162,503	563,945	568,820	555,200	559,414
Oregon	601,442	620,167	628,558	620,167	620,167	567,436	590,970	650,642
Pennsylvania	2,990,520	3,344,077	3,533,074	3,871,889	3,840,670	3,575,285	3,483,081	3,663,982
Rhode Island	144,419	150,950	149,689	152,361	166,114	145,975	140,709	147,739
South Carolina	566,260	597,026	605,804	677,390	741,921	786,791	869,505	972,436
South Dakota	171,003	186,923	187,195	185,385	186,274	182,656	196,615	201,739
Tennessee	863,474	900,440	913,764	1,100,446	1,170,868	1,215,651	1,219,926	1,223,550
Texas	3,445,453	3,490,068	3,559,908	3,682,135	3,737,778	3,389,024	3,678,337	3,879,703
Utah	361,727	418,371	482,344	496,483	513,951	504,410	546,428	577,851
Vermont	121,930	116,635	118,837	119,774	120,373	108,911	102,707	113,157
Virginia	772,831	888,595	926,645	922,526	931,607	887,049	1,056,638	1,283,200
Washington	1,198,314	1,418,640	1,631,638	1,701,372	1,655,251	1,584,663	1,469,550	1,670,705
West Virginia	382,743	358,708	357,569	403,155	424,496	391,604	371,765	405,390
Wisconsin	992,861	1,016,899	1,034,369	1,054,023	1,053,856	1,018,873	1,031,812	1,104,932
Wyoming	168,302	162,140	168,375	165,528	174,722	162,712	167,816	172,903

Data Source: FHWA Highway Statistics Series https://www.fhwa.dot.gov/policyinformation/statistics.cfm & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1J – Annual Registrations of All Electric Vehicles (2016-2022)

State	2016	2017	2018	2019	2020	2021	2022
Alabama	500	800	1,300	2,000	2,900	4,700	8,700
Alaska	200	400	500	700	900	1,300	2,000
Arizona	4,700	7,200	12,600	19,500	28,800	40,700	65,800
Arkansas	200	300	600	900	1,300	2,400	5,100
California	141,500	189,700	273,500	349,700	425,300	563,100	903,600
Colorado	5,300	8,000	12,500	19,200	24,700	37,000	59,900
Connecticut	2,000	3,000	5,000	6,900	9,000	13,300	22,000
Delaware	300	400	800	1,300	1,900	3,000	5,400
Dist. of Col.	600	800	1,100	1,800	2,400	3,700	5,900
Florida	11,600	15,900	27,400	40,300	58,200	95,600	168,000
Georgia	18,000	14,400	15,900	19,000	23,500	34,000	60,100
Hawaii	4,200	5,400	6,600	8,800	10,700	14,200	19,800
Idaho	400	700	1,100	1,600	2,300	3,500	5,900
Illinois	5,800	8,300	13,600	19,300	26,000	36,500	66,900
Indiana	1,300	1,900	3,400	5,100	7,000	10,400	17,700
Iowa	400	600	1,100	1,600	2,300	3,700	6,200
Kansas	600	1,000	1,700	2,300	3,100	4,500	7,600
Kentucky	500	700	1,200	1,900	2,600	4,200	7,600
Louisiana	400	600	900	1,400	2,000	3,200	5,900
Maine	300	500	800	1,300	1,900	3,000	5,000
Maryland	3,200	4,400	8,400	13,200	18,000	25,600	46,100
Massachusetts	3,600	5,600	10,300	14,100	21,000	30,500	49,400
Michigan	1,600	2,500	4,200	6,600	10,600	17,500	33,100
Minnesota	1,600	2,300	4,900	7,700	10,400	15,000	24,300
Mississippi	100	200	300	500	800	1,300	2,400
Missouri	1,400	2,100	3,500	4,900	6,700	10,000	17,900
Montana	200	300	500	700	900	1,600	3,300
Nebraska	300	500	900	1,300	1,800	2,700	4,600
Nevada	2,000	3,100	5,100	7,900	11,000	17,400	32,900
New Hampshire	400	600	1,200	1,900	2,700	4,000	7,000
New Jersey	4,200	6,900	13,400	20,200	30,400	47,800	87,000
New Mexico	500	700	1,300	1,900	2,600	4,200	7,100
New York	6,100	9,400	15,500	23,000	32,600	51,900	84,700
North Carolina	2,900	4,400	7,300	11,600	16,200	25,200	45,600
North Dakota	0	100	100	200	200	400	600
Ohio	2,600	3,700	6,400	10,200	14,500	21,200	34,100
Oklahoma	600	1,200	3,700	3,400	3,400	7,100	16,300
Oregon	7,700	10,000	13,800	18,800	22,800	30,300	47,000
Pennsylvania	3,200	4,400	8,000	12,000	17,500	26,800	47,400
Rhode Island	300	400	700	1,100	1,600	2,500	4,300
South Carolina	800	1,200	2,000	3,000	4,400	7,400	13,500
South Dakota	100	100	200	300	400	700	1,200
Tennessee	2,600	2,900	3,900	5,700	7,800	12,200	22,000
Texas	11,900	16,100	24,500	38,400	52,200	80,900	149,000
Utah	2,500	3,600	5,600	8,000	11,200	16,500	28,000
Vermont	300	700	1,100	1,700	2,200	3,400	5,300
Virginia	3,100	5,100	9,900	15,000	20,500	30,700	56,600
Washington	14,900	21,000	30,200	40,400	50,500	66,800	104,100
West Virginia	100	100	200	400	600	1,000	1,900
Wisconsin	2,600	2,800	3,700	4,700	6,300	9,300	15,700
Wyoming	100	100	200	200	300	500	800

Data Source: U.S. Department of Energy, Alternative Fuels Data Center https://afdc.energy.gov/ & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1K – Annual Registrations of Hybrid Electric Vehicles (2016-2022)

State	2016	2017	2018	2019	2020	2021	2022
Alabama	30,000	31,700	33,300	35,500	38,400	45,800	55,200
Alaska	5,200	5,500	5,700	6,200	6,600	7,800	9,700
Arizona	94,000	101,800	109,700	117,700	126,600	147,700	171,200
Arkansas	19,600	20,600	21,100	22,100	23,500	27,900	33,100
California	1,083,400	1,198,900	1,300,300	1,401,500	1,494,200	1,671,200	1,875,100
Colorado	77,800	85,000	92,100	101,700	107,300	129,700	155,800
Connecticut	46,000	49,100	50,300	53,100	55,800	64,600	77,600
Delaware	11,900	12,800	13,500	14,500	16,300	18,700	22,300
Dist. of Col.	12,300	14,300	14,900	15,000	15,900	18,600	20,400
Florida	217,200	233,100	244,300	255,700	270,900	319,200	384,500
Georgia	90,400	97,400	104,100	110,200	118,400	141,800	165,300
Hawaii	23,800	25,400	27,200	28,700	29,600	33,300	38,200
Idaho	16,900	18,500	20,700	23,400	26,600	32,900	40,000
Illinois	152,500	163,500	173,700	188,900	203,600	232,600	269,800
Indiana	56,900	62,900	68,100	73,600	80,600	95,700	111,000
Iowa	28,100	30,500	32,700	35,500	39,000	46,100	53,500
Kansas	27,200	29,500	31,400	33,800	36,400	41,600	47,800
Kentucky	31,800	35,100	37,300	39,800	43,400	51,400	60,200
Louisiana	18,200	19,400	19,900	20,800	22,800	28,000	34,300
Maine	18,900	20,200	21,400	22,800	25,200	29,700	34,600
Maryland	90,900	97,700	103,700	110,700	121,600	148,100	169,100
Massachusetts	103,500	111,500	118,600	125,300	138,200	161,000	189,100
Michigan	76,500	84,000	91,300	98,900	105,900	123,600	147,100
Minnesota	61,300	66,400	75,800	83,200	90,500	104,100	117,200
Mississippi	12,000	13,100	14,100	15,000	16,500	19,800	23,900
Missouri	65,900	92,100	102,800	91,200	82,900	92,800	105,500
Montana	10,000	10,300	10,400	11,000	11,800	15,000	18,800
Nebraska	15,100	16,600	17,800	19,300	21,500	25,700	30,200
Nevada	32,100	36,400	40,200	43,700	47,100	56,500	67,900
New Hampshire	20,200	21,800	22,700	24,100	25,800	30,500	35,900
New Jersey	86,400	93,000	100,000	111,600	117,400	140,000	169,400
New Mexico	21,400	24,600	26,300	28,400	30,400	35,600	41,500
New York	178,600	188,100	197,500	210,800	225,300	266,200	319,400
North Carolina	111,000	119,100	125,900	134,700	142,700	165,100	194,100
North Dakota	3,500	3,900	3,900	4,200	4,700	5,800	7,200
Ohio	96,300	104,200	112,100	123,100	133,600	156,800	183,500
Oklahoma	25,500	26,800	29,100	30,100	31,900	45,600	58,500
Oregon	87,600	96,900	104,700	112,400	117,900	140,100	161,400
Pennsylvania	108,600	117,600	124,300	137,500	153,600	186,000	225,000
Rhode Island	11,600	12,600	13,600	14,400	15,700	18,700	22,000
South Carolina	40,500	43,500	46,000	49,100	52,700	62,100	73,500
South Dakota	5,500	6,100	6,600	7,000	7,700	9,400	11,300
Tennessee	50,100	55,500	62,100	67,900	73,000	86,100	102,900
Texas	213,800	228,000	242,400	262,700	282,700	335,300	404,600
Utah	34,400	39,200	44,300	49,700	55,000	66,000	79,500
Vermont	12,800	13,800	14,600	15,300	16,200	19,000	22,000
Virginia	130,900	142,900	149,400	160,800	169,000	192,300	220,100
Washington	149,800	174,900	191,500	209,500	229,700	264,300	301,600
West Virginia	9,500	10,100	10,600	11,500	12,600	15,500	19,700
Wisconsin	64,300	70,600	75,400	81,500	88,400	101,200	115,200
Wyoming	3,900	4,100	4,300	4,400	5,000	6,100	7,500

Data Source: U.S. Department of Energy, Alternative Fuels Data Center https://afdc.energy.gov/ & Author computations. Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 1L – Annual Registrations of Internal Combustion Engine Vehicles (2015-2022)

State	2015	2016	2017	2018	2019	2020	2021	2022
Alabama	5,093,870	5,058,314	4,657,848	4,898,233	4,884,091	4,905,326	5,028,306	5,051,867
Alaska	714,169	672,539	698,707	705,111	700,836	694,985	665,463	658,207
Arizona	5,068,315	5,115,582	5,386,236	5,260,791	5,431,368	5,534,020	5,470,594	5,489,890
Arkansas	2,515,280	2,528,765	2,537,528	2,503,962	2,508,815	2,512,818	2,613,777	2,596,698
California	27,087,458	26,568,721	26,867,970	26,858,110	26,920,354	26,362,816	26,426,139	25,727,184
Colorado	4,580,710	4,583,212	4,721,106	4,804,260	4,846,506	4,862,026	4,818,561	4,854,489
Connecticut	2,656,275	2,608,328	2,585,770	2,636,976	2,633,553	2,622,655	2,562,679	2,568,824
Delaware	902,459	922,746	895,507	933,226	939,791	948,258	725,875	731,654
Dist. of Col.	298,289	293,987	305,000	306,329	305,319	316,149	307,189	311,533
Florida	14,920,953	15,106,571	15,430,879	15,915,371	16,220,963	16,606,666	16,972,012	17,203,476
Georgia	7,521,654	7,512,752	7,681,236	7,723,928	7,792,138	7,888,125	7,971,675	7,955,715
Hawaii	1,168,730	1,127,280	1,149,924	1,160,001	1,153,777	1,139,066	1,133,074	1,116,346
Idaho	1,681,207	1,635,251	1,628,393	1,661,611	1,732,500	1,741,397	1,742,716	1,745,714
Illinois	9,745,662	9,279,087	9,774,225	9,410,913	9,500,622	9,427,281	9,455,186	9,114,171
Indiana	5,294,105	5,317,239	5,295,635	5,302,260	5,324,145	5,321,110	5,312,955	5,290,093
Iowa	3,225,826	3,204,967	3,246,829	3,162,625	3,254,812	3,237,468	3,240,202	3,213,699
Kansas	2,369,187	2,364,059	2,394,866	2,333,321	2,331,666	2,281,276	2,253,743	2,225,196
Kentucky	3,830,401	3,857,836	3,919,589	3,981,623	3,982,557	4,017,340	3,996,157	3,962,574
Louisiana	3,568,141	3,544,334	3,538,142	3,509,956	3,499,433	3,473,520	3,441,699	3,650,288
Maine	989,051	974,232	949,399	969,418	971,510	964,516	1,032,663	997,339
Maryland	3,823,602	3,769,523	3,945,644	3,784,777	3,777,754	3,770,787	4,045,145	4,009,134
Massachusetts	4,720,158	4,594,579	4,610,064	4,595,486	4,591,270	4,565,848	4,592,691	4,546,594
Michigan	7,719,116	7,671,181	7,808,683	7,633,897	7,682,730	7,698,635	8,049,465	8,010,699
Minnesota	4,752,534	4,760,358	5,040,092	4,725,347	4,742,137	4,823,818	4,783,263	4,812,807
Mississippi	1,935,570	1,936,804	1,887,283	1,865,661	1,861,189	1,837,355	1,934,350	1,868,319
Missouri	5,106,537	5,136,840	4,990,105	4,875,152	4,939,092	4,922,629	4,873,495	4,738,202
Montana	1,329,265	1,357,126	1,422,498	1,419,148	1,429,200	1,477,272	1,507,897	1,543,396
Nebraska	1,757,407	1,711,042	1,672,223	1,630,795	1,636,138	1,589,198	1,556,860	1,533,129
Nevada	2,156,876	2,193,729	2,255,058	2,312,497	2,338,881	2,352,238	2,415,230	2,413,251
New Hampshire	1,165,801	1,160,253	1,156,801	1,180,247	1,194,781	1,191,548	1,211,576	1,217,748
New Jersey	5,473,231	5,412,477	5,506,486	5,486,413	5,447,938	5,439,048	5,502,183	5,361,908
New Mexico	1,650,446	1,623,300	1,541,621	1,623,357	1,623,389	1,610,280	1,606,744	1,589,916
New York	9,846,472	10,040,775	9,784,785	10,392,268	10,290,537	10,366,483	9,513,233	9,627,910
North Carolina	7,346,866	7,548,899	7,304,196	7,400,688	7,704,419	7,792,852	7,784,855	7,876,814
North Dakota	740,739	738,522	868,342	716,126	719,289	705,931	701,638	726,907
Ohio	9,646,645	9,638,835	9,722,010	9,785,076	9,760,425	9,720,681	9,684,058	9,703,111
Oklahoma	2,597,606	3,344,019	3,338,474	3,283,480	3,289,066	3,282,140	3,123,749	3,101,727
Oregon	3,260,040	3,345,843	3,629,682	3,468,022	3,431,559	3,523,748	3,499,398	3,552,265
Pennsylvania	9,651,864	9,661,182	9,556,411	9,543,735	9,606,220	9,497,837	9,470,758	9,376,597
Rhode Island	811,772	798,179	796,476	797,722	797,154	794,653	761,852	760,222
South Carolina	3,827,919	3,911,541	3,960,359	4,004,322	4,051,933	4,082,726	4,294,304	4,353,128
South Dakota	889,100	1,013,945	1,016,663	1,017,195	1,024,158	1,041,912	1,070,956	1,098,534
Tennessee	5,146,488	5,206,891	5,338,147	5,307,325	5,341,788	5,374,119	5,700,348	5,755,839
Texas	20,337,317	19,961,363	20,322,910	20,355,898	21,128,740	21,196,253	21,145,987	21,242,110
Utah	2,014,823	2,069,522	2,107,505	2,119,404	2,147,339	2,171,629	2,297,160	2,303,092
Vermont	591,261	532,633	536,783	532,019	532,011	518,400	502,026	491,167
Virginia	6,739,822	6,652,114	6,850,048	6,923,486	6,954,247	6,938,973	6,958,977	7,002,215
Washington	6,104,088	6,220,354	6,425,500	6,314,090	6,506,490	6,483,954	6,767,071	6,711,506
West Virginia	1,469,484	1,537,227	1,526,113	1,527,783	1,515,740	1,509,688	1,380,930	1,514,380
Wisconsin	4,850,069	4,847,976	4,869,178	4,924,794	4,951,487	4,941,618	4,954,277	4,946,406
Wyoming	722,117	728,203	713,347	738,194	745,531	750,059	754,309	760,622

Data Source: Author computations based on (Total Registrations – EVs – HEVs). Certain Data have been modified to align with the model and eliminate the outliers.

APPENDIX 2A – Author Computations of Revenue Trends (2015–2022) and Revenue per mile

State	Change in Revenue (2015 vs 2022)	Rev Change per VMT (2015 vs 2022)	Revenue in cents/mile (2022)
Alabama	41%	33%	1.31
Alaska	-6%	-14%	0.55
Arizona	21%	4%	1.05
Arkansas	35%	22%	1.53
California	54%	64%	2.68
Colorado	5%	-2%	1.18
Connecticut	-17%	-12%	2.43
Delaware	14%	15%	1.35
Dist. of Col.	-9%	-6%	0.67
Florida	25%	13%	1.34
Georgia	77%	63%	1.41
Hawaii	-9%	-9%	0.74
Idaho	67%	45%	2.08
Illinois	105%	108%	2.4
Indiana	117%	79%	1.88
Iowa	44%	46%	2.16
Kansas	4%	4%	1.48
Kentucky	-7%	-6%	1.64
Louisiana	4%	-11%	1.1
Maine	2%	1%	1.68
Maryland	25%	27%	2.01
Massachusetts	-4%	0%	1.27
Michigan	40%	43%	1.44
Minnesota	4%	4%	1.59
Mississippi	10%	10%	1.1
Missouri	8%	-2%	0.93
Montana	31%	20%	2.04
Nebraska	17%	10%	1.82
Nevada	34%	26%	2.81
New Hampshire	1%	0%	1.37
New Jersey	-10%	-10%	0.65
New Mexico	8%	10%	1.14
New York	3%	8%	1.47
North Carolina	22%	14%	1.95
North Dakota	-19%	-12%	1.82
Ohio	47%	51%	2.41
Oklahoma	23%	32%	1.26
Oregon	8%	6%	1.78
Pennsylvania	23%	24%	3.67
Rhode Island	2%	6%	1.96
South Carolina	72%	51%	1.65
South Dakota	18%	8%	1.98
Tennessee	42%	31%	1.47
Texas	13%	0%	1.33
Utah	60%	38%	1.68
Vermont	-7%	-5%	1.59
Virginia	66%	67%	1.56
Washington	39%	42%	2.86
West Virginia	6%	37%	2.65
Wisconsin	11%	4%	1.67
Wyoming	3%	6%	1.85

APPENDIX 2B – EV & HEV Annual Registration (Supplemental Fee) as on December 2024

State	EV Annual Fee ($)	HEV Annual Fee ($)	Source / Reference (Accessed during Dec 2024)
Alabama	$203	$103	https://www.revenue.alabama.gov/tax-types/motor-vehicle-registration-fees/
Alaska	-	-	
Arizona	-	-	
Arkansas	$200	$100	https://www.dfa.arkansas.gov/mydmv-service/registration-fee-schedule/
California	$118	-	https://www.dmv.ca.gov/portal/driver-education-and-safety/educational-materials/fast-facts/registration-related-fees-ffvr-34/
Colorado	$62	-	https://dmv.colorado.gov/taxes-and-fees
Connecticut	-	-	
Delaware	-	-	
Dist. of Col.	-	-	
Florida	-	-	
Georgia	$220	-	https://dor.georgia.gov/alternative-fuel-vehicles-annual-licensing-fees-policy-bulletin
Hawaii	$50	-	https://energy.hawaii.gov/ev-laws-incentives/
Idaho	$140	$75	https://itd.idaho.gov/itddmv/?target=registration-plates#collapse-registration-fees
Illinois	$100	-	https://www.ilsos.gov/departments/vehicles/license_plate_guide/environmental.html
Indiana	$221	$74	https://www.in.gov/bmv/fees-taxes/vehicle-registration-fees-and-taxes/ --> Fee Chart
Iowa	$130	$65	https://www.iowataxandtags.org/vehicle-registration/registration-fees-by-vehicle-type/
Kansas	$100	$50	https://www.ksrevisor.org/statutes/chapters/ch08/008_001_0043.html
Kentucky	$120	$60	https://drive.ky.gov/Pages/EV-HV-Fee.aspx
Louisiana	$110	$60	https://revenue.louisiana.gov/EHRoadUsageFee
Maine	-	-	
Maryland	$125	$100	https://mva.maryland.gov/about-mva/Pages/fees.aspx --> Miscellaneous Fees
Massachusetts	-	-	
Michigan	$160	$60	https://www.michigan.gov/sos/vehicle/license-plates --> Vehicle registration
Minnesota	$75	-	https://dps.mn.gov/divisions/dvs/vehicle/vehicle-fees
Mississippi	$150	$75	https://afdc.energy.gov/laws/12141
Missouri	$120	$60	https://dor.mo.gov/motor-vehicle/fuel-decals.html
Montana	$130	$70	https://archive.legmt.gov/bills/2023/billpdf/HB0060.pdf
Nebraska	$75	-	https://dmv.nebraska.gov/dvr/reg/registration-fees-and-taxes
Nevada	-	-	
New Hampshire	$100	$50	https://afdc.energy.gov/laws/13348
New Jersey	$250	-	https://www.nj.gov/mvc/vehicles/reginitial.htm
New Mexico	-	-	
New York	-	-	
North Carolina	$215	$107	https://www.ncdot.gov/dmv/title-registration/vehicle/Pages/fees.aspx
North Dakota	$120	$50	https://www.dot.nd.gov/motor-vehicle
Ohio	$200	$150	https://www.bmv.ohio.gov/vr-firstissuance.aspx
Oklahoma	$110	$82	https://law.justia.com/codes/oklahoma/title-68/section-68-6511/
Oregon	$160	-	https://www.oregon.gov/odot/dmv/pages/fees/vehicle.aspx
Pennsylvania	$200	$50	https://afdc.energy.gov/laws/13521
Rhode Island	-	-	
South Carolina	$120	$60	https://www.scdmvonline.com/fees
South Dakota	$50	-	https://dor.sd.gov/individuals/motor-vehicle/all-vehicles-title-fees-registration/
Tennessee	$200	$100	https://revenue.support.tn.gov/hc/en-us/articles/360060541291-VR-5-Registration-Fees-for-Hybrid-or-Electric-Vehicles
Texas	$200	-	https://www.txdmv.gov/
Utah	$130	$60	https://afdc.energy.gov/laws/12063
Vermont	$178	$135	https://dmv.vermont.gov/registrations/fees
Virginia	$128	-	https://www.dmv.virginia.gov/sites/default/files/forms/dmv201.pdf
Washington	$225	$75	https://afdc.energy.gov/laws/9974
West Virginia	$200	$100	https://transportation.wv.gov/dmv/dmvformsearch/registration-fees-brochure.pdf
Wisconsin	$175	$75	https://wisconsindot.gov/Pages/dmv/vehicles/frms-pubs/Legislation-Affecting-DMV.aspx
Wyoming	$200	-	https://www.bmv.ohio.gov/vr-firstissuance.aspx

APPENDIX 2C – Projected EV Recovery Fee for Year 2030

State	Annual Fee – LDV ($)	Annual Fee – MC ($)	Annual Fee – Bus ($)	Annual Fee – Trucks ($)	VMT Fee – LDV (¢/mile)	Electricity Excise tax – LDV (¢/kwh)
Alabama	$152.98	$32.65	$2,618.08	$1,209.98	¢1.22	¢0.89
Alaska	$25.01	$2.38	$24.35	$101.98	¢0.32	¢0.24
Arizona	$83.62	$8.80	$1,331.82	$1,819.59	¢0.73	¢0.54
Arkansas	$128.22	$6.61	$1,160.95	$916.02	¢1.00	¢0.74
California	$255.93	$144.48	$2,432.77	$1,425.28	¢2.84	¢2.08
Colorado	$90.65	$11.59	$511.00	$355.18	¢0.97	¢0.71
Connecticut	$101.38	$7.86	$1,468.45	$1,544.43	¢1.01	¢0.74
Delaware	$103.59	$18.02	$1,209.49	$855.00	¢0.93	¢0.68
Dist. of Col.	$85.46	$14.20	$153.66	$90.47	¢0.97	¢0.71
Florida	$175.51	$15.71	$1,225.08	$1,478.45	¢1.70	¢1.25
Georgia	$164.34	$15.12	$929.04	$1,256.73	¢1.22	¢0.89
Hawaii	$52.79	$2.78	$316.26	$271.25	¢0.65	¢0.48
Idaho	$135.95	$13.80	$599.84	$579.35	¢1.34	¢0.98
Illinois	$168.63	$27.57	$1,143.09	$1,429.89	¢1.82	¢1.34
Indiana	$225.35	$16.64	$1,305.50	$1,407.38	¢1.66	¢1.22
Iowa	$107.06	$1.27	$418.35	$510.63	¢1.26	¢0.92
Kansas	$115.76	$6.88	$129.62	$482.21	¢0.97	¢0.71
Kentucky	$98.79	$13.86	$1,097.67	$629.88	¢1.01	¢0.74
Louisiana	$122.32	$20.47	$222.19	$632.41	¢0.81	¢0.60
Maine	$149.26	$29.88	$930.63	$421.44	¢1.22	¢0.89
Maryland	$208.88	$19.20	$614.92	$1,357.18	¢1.82	¢1.34
Massachusetts	$104.96	$17.87	$700.77	$441.71	¢0.97	¢0.71
Michigan	$125.94	$10.65	$718.61	$557.66	¢1.22	¢0.89
Minnesota	$115.51	$5.89	$869.01	$475.43	¢1.15	¢0.85
Mississippi	$131.55	$9.81	$551.47	$280.37	¢0.73	¢0.54
Missouri	$160.61	$35.10	$769.86	$966.15	¢1.09	¢0.80
Montana	$93.84	$1.24	$535.32	$189.63	¢1.34	¢0.98
Nebraska	$144.28	$5.71	$111.38	$209.76	¢1.17	¢0.86
Nevada	$81.40	$16.12	$1,414.01	$1,768.37	¢0.97	¢0.71
New Hampshire	$82.33	$7.13	$660.70	$360.69	¢0.89	¢0.65
New Jersey	$181.96	$12.76	$436.86	$1,167.71	¢1.50	¢1.10
New Mexico	$98.66	$25.77	$921.55	$619.60	¢0.69	¢0.51
New York	$104.20	$6.02	$346.25	$803.65	¢1.01	¢0.74
North Carolina	$207.81	$24.95	$1,219.09	$740.23	¢1.62	¢1.19
North Dakota	$97.52	$2.01	$319.60	$200.95	¢0.93	¢0.68
Ohio	$154.70	$12.40	$1,216.38	$875.49	¢1.58	¢1.16
Oklahoma	$82.94	$4.74	$2,686.17	$465.53	¢0.81	¢0.60
Oregon	$117.92	$13.99	$862.27	$1,022.59	¢1.62	¢1.19
Pennsylvania	$218.06	$30.68	$1,383.71	$1,367.55	¢2.43	¢1.79
Rhode Island	$132.58	$8.33	$240.33	$814.31	¢1.50	¢1.10
South Carolina	$133.04	$12.34	$421.39	$531.17	¢1.13	¢0.83
South Dakota	$87.56	$5.79	$188.36	$489.28	¢1.22	¢0.89
Tennessee	$121.39	$10.82	$143.80	$2,136.45	¢1.05	¢0.77
Texas	$95.71	$6.67	$286.23	$1,108.58	¢0.81	¢0.60
Utah	$150.38	$11.13	$1,030.10	$3,394.23	¢1.42	¢1.04
Vermont	$151.88	$13.72	$1,359.33	$353.48	¢1.22	¢0.89
Virginia	$119.23	$8.31	$581.53	$992.03	¢1.22	¢0.89
Washington	$127.50	$9.16	$407.00	$652.88	¢2.00	¢1.47
West Virginia	$121.34	$12.19	$2,159.67	$887.22	¢1.45	¢1.06
Wisconsin	$145.27	$4.91	$1,597.70	$848.37	¢1.25	¢0.92
Wyoming	$93.50	$18.65	$287.44	$470.88	¢0.97	¢0.71