



Driving Change:

Advice for the National VMT-Fee Pilot



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About the Eno Center for Transportation

The Eno Center for Transportation (Eno) was founded in 1921 by William Phelps Eno (1859-1945), who pioneered the field of traffic management in the United States and Europe. Mr. Eno sought to promote safe mobility by ensuring that traffic control became an accepted role of government and traffic engineering became a recognized professional discipline. As a non-profit 501(c)(3) organization, Eno can look back on a long and proud history as a thought leader in national transportation policy with a strong training and leadership program.

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Acronyms

API	Application Programming Interface
ASCE	American Society of Civil Engineers
CAFE	Corporate Average Fuel Economy
CPI	Consumer Price Index
COVID-19	Severe Acute Respiratory Syndrome Coronavirus 2
DBF	Distance-Based Fee
DMV	Department of Motor Vehicles
DOE	Department of Energy
DOT	Department of Transportation
EPA	Environmental Protection Agency
EU	European Union
EV	Electric Vehicles
FACA	Federal Advisory Committee Act
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FY	Fiscal Year
GPS	Global Positioning System
GVWR	Gross Vehicle Weight Rating
HGV	Heavy Goods Vehicle
HTF	Highway Trust Fund
HUF	Highway Use Fee
HVUT	Heavy Vehicle Use Tax

IFTA	International Fuel Tax Agreement/Association
IIJA	Infrastructure Investment and Jobs Act
IRP	International Registration Plan
ISTEA	Intermodal Surface Transportation Efficiency Act
KWh	Kilowatt-hour
MBUF	Mileage-Based User Fee
MBUFA	Mileage-Based User Fee Alliance
MFT	Motor Fuel Tax
MPG	Miles Per Gallon
NASBO	National Association of State Budget Officers
OBD-II	On-Board Diagnostic II
OEM	Original Equipment Manufacturer
OMB	Office of Management and Budget
OPEC	Organization of Petroleum Exporting Countries
RFID	Radio Frequency Identification
RUC	Road Usage/User Charge
SIRC	Strategic Innovation for Revenue Collection
STSFA	Surface Transportation System Funding Alternatives
SUV	Sport Utility Vehicle
TETC	The Eastern Transportation Coalition
USDOT	U.S. Department of Transportation
VMT	Vehicle-mile traveled
WTI	West Texas Intermediate

Executive Summary

In 2009, the National Surface Transportation Infrastructure Financing Commission concluded that the United States needed a new approach to transportation infrastructure funding.¹ It recognized that alternative fuels and more efficient vehicle technology threatened the long-term stability of a financial system based on revenues generated from the federal excise tax on fuel purchases.

Today, those threats to transportation funding are not only still present, they are magnified. The national policy priority for electrification ensures that many new vehicles pay no motor fuel taxes, and for all vehicles the rate at which total miles driven in the United States increases has dropped significantly in recent decades. At the same time, federal policymakers are unable or unwilling to increase highway user tax rates, even to keep pace with inflation. The result is a system that has required over a quarter trillion-dollar infusion of revenue over only the last 15 years and effectively severed the principle of "user-pay, user-benefit."

A system where drivers are charged for each mile driven has long been acknowledged as a viable and sustainable long-term option for national transportation funding. Known alternatively as a vehicle miles traveled (VMT) fee, mileage-based user fee (MBUF), or road usage charge (RUC), its application based on distance travelled (and potentially varied by geography, vehicle weight, time of day, and other variables) offers an enticing alternative. Indeed, states from coast-to-coast have begun testing their own systems and deploying pilot programs. These experiments are providing valuable lessons regarding privacy protection, cost of administration, equity, interoperability, and complexity of implementation.

With that as a background, the Infrastructure Investment and Jobs Act of 2021 (IIJA) requires the U.S. Secretary of Transportation to establish a national pilot to "test the design, acceptance, implementation, and financial sustainability" of a VMT-fee system. It requires the creation of a Federal System Funding Alternative Advisory Board that will provide an annual report to Congress and ultimately create recommendations for a possible permanent VMT fee.

To inform that federal initiative, the Eno Center for Transportation assembled an advisory panel, reviewed existing data and literature, evaluated best practices, and convened expert workshops. This resulting paper provides clear recommendations for the federal government to consider for an efficient VMT-fee pilot. Since the IIJA only authorized \$50 million over five years for the program, Eno worked with expert stakeholders to develop a set of goals on which the program should focus and recommendations as to how to meet those goals.

For example, the federal program should commit to constructing the simplest implementation possible. This will help determine which data elements are needed to administer a full national VMT-fee program. In doing so, they should test scalability

and, where possible, measure the impact on administrative practices and cost. It is also important for the federal pilot to distinguish between certain elements of a national program versus what the states are exploring today. The national test needs to consider cross-border travel with Canada and Mexico, as well as how to standardize elements such as vehicle classifications, weight definitions, and models for data formatting, sharing, and protection.

Time is of the essence, and Eno recommends the federal government assemble the Federal Advisory Board as soon as possible. The board should include a diverse range of voices, employ a subcommittee structure to address topics such as interoperability and standardization, and choose its chair from among its membership. The board should have an active role in identifying the needs for the national pilot, without overburdening it with explorations of elements already explored at the state level. To administer the program, the federal government should consider using commercial account managers to manage the data, payment, and technology needs of the pilot, as is done in most of the state and regional pilots.

The national pilot will also need to build on existing pilots and focus specifically on options and potential obstacles for a VMT-fee pilot for commercial trucks. For example, a national VMT-fee pilot for commercial vehicles should test various rate structures including a fee based on gross vehicle weight rating, gross registered weight, and vehicle class. This rate structure should be straightforward and not present undue reporting burdens for the trucking industry. Although commercial vehicles present unique challenges to international border VMT-fee testing, that element does not need to be prioritized.

The largest unknown for a national VMT fee is implementation on all private passenger vehicles. While other countries have addressed many of the implementation concerns with regard to VMT fees, there are still no widespread programs anywhere in the world that impose a fee on all passenger vehicles. Fortunately, state and regional level pilots in the United States have examined VMT-fee implementations for over a decade and provided many of the answers needed to determine their feasibility. However, questions remain and implementing a program at the federal level presents its own set of challenges. It is therefore important for the federal program to only test those elements that demand the unique perspective of a national system.

The national pilot should employ phasing to use the funds and time available more effectively. In other words, certain VMT-fee implementations can be tested in different regions, and they do not all have to take place at the same time or for the same amount of time. It should test the minimum data required to administer a national VMT fee, scalability, and administrative models in order to mitigate concerns over privacy. One potential model could use three different passenger-vehicle groups or cohorts to allow for the testing of different rate structures and administrative models, including how it might look for a state to administer both a state and federal VMT fee and remit the fee to the federal government, and vice-versa.

Finally, an education and outreach campaign will be a critical part of the exploration and recommendation of fuel tax replacements. IIJA gives the federal advisory board the opportunity to carry out a public awareness campaign regarding a national motor vehicle per-mile user fee, including distribution of information related to the pilot program, and consumer privacy. It is important for the education to go beyond what is proposed in IIJA and more generally provide education about the transportation funding crisis in the United States. Ultimately, the pilot will only be useful if it provides the ability to fully understand the benefits of the user-pay model and to weigh the potential of using a different funding model entirely.

1.0 Introduction

Around the world, roadways are relied upon to transport goods and people quickly and efficiently. According to the Federal Highway Administration (FHWA), 3.17 trillion miles were driven in the United States in 2022.² In that same period, those roads also moved 12.8 billion tons of freight, a 65 percent share of total freight movements.³ These numbers are expected to increase over the coming decades, placing increased burden on the roadway system. Unfortunately, the American Society of Civil Engineers' (ASCE) *2021 Report Card for America's Infrastructure* found that 43 percent of public roadways in the United States are in poor or mediocre condition, resulting in an overall roadway infrastructure grade of "D" on an A to F scale.⁴ ASCE estimates a \$786 billion* backlog of road and bridge capital needs due to underfunding.⁵

Paying for this backlog will be a challenge. While transportation funding has evolved during the interstate highway era, roadways have been funded mostly through motor fuel taxes (MFTs). Historically, MFTs provided a simple and efficient revenue source: the tax is levied at the distribution level simplifying administration and collection and gasoline consumption was a plausible indicator of road usage. Over time, however, as motor vehicles become more fuel efficient or electric, the fuel tax is no longer an accurate measure allowing some to pay far less than others for their road usage. As the number of miles traveled increases, the number of gallons of gasoline purchased per mile decreases, meaning less revenue to pay for an increased need of road maintenance and construction.

Even without increased fuel efficiencies, the buying power of the federal MFT has decreased over time. The federal fuel tax has remained constant since 1993: 18.4 cents per gallon of gasoline, and 24.4 cents per gallon of diesel fuel.⁷ Unlike some state-level MFTs, the federal MFT is not indexed to inflation, meaning that in 2023, the buying power of the 18.3 cent portion of the federal gas tax dedicated to surface transportation has

18.3 vs 18.4 Cents

While the federal MFT collected at the pump is 18.4 cents, a tenth of a cent is dedicated to the Leaking Underground Storage Tank (LUST) Trust Fund for abandoned service station cleanup, meaning that 18.3 cents of the federal MFT is dedicated to surface transportation.⁶ This report uses 18.4 cents when referencing the amount paid through fuel purchases, and uses 18.3 cents when referencing the dedicated revenue the federal MFT generates for transportation.

* Note that this number does not consider roadway funding in IIJA as the report card was released prior to its passage. It also is likely much higher now due to the unprecedented inflation of construction materials costs in 2021 and 2022.

dropped by over two-thirds since the full amount was first fully dedicated to surface transportation in 1998.

Federal roadways funding has been managed through the Highway Trust Fund (HTF) since 1957. The user-pay system provided long-term stability for highway capital funding but starting in 2008, the combination of slowed growth of highway use, increasing fuel efficiency of vehicles, and the inability of the political system to restrain spending in the face of either of those previous conditions, pushed the HTF into financial insolvency. Since then, Congress has been unable to increase user tax rates and instead kept the HTF solvent through \$272 billion in bailout transfers, which should be enough to maintain solvency through 2028.⁸

Because of this history, policymakers and researchers have been exploring new ways to fund U.S. transportation infrastructure for decades. Vehicle-miles traveled (VMT) fees have been proposed as an alternative or a supplement to MFTs. Also known as a road usage charge (RUC) or a mileage-based user fee (MBUF), VMT fees look to charge drivers by the number of miles they drive instead of by the gallon of gas purchased. State officials have recognized their potential and, as of July 2023, 13 states implemented VMT-fee pilot programs to test their feasibility, three of which graduated into full-fledged programs. Although some of the questions about feasibility have been explored through these programs, there are others that remain to be answered, especially in regard to a federal program.

The Infrastructure Investment and Jobs Act of 2021 (IIJA) significantly increased funding levels for infrastructure in the United States, including a 66 percent increase in transit and 56 percent in road and bridge infrastructure for FY22-FY26 compared to the previous 5-year period. The majority of this increase comes from the general fund, and not from designated transportation funds like the HTF. Acknowledging this, lawmakers included a provision, Section 13002, directing the U.S. Department of Transportation (USDOT), in partnership with the U.S. Department of the Treasury, to establish a National Motor Vehicle Per-Mile User Fee Pilot to "demonstrate a national motor vehicle per-mile user fee to restore and maintain the long-term solvency of the HTF; and to maintain the surface transportation system." The pilot must include all 50 states and findings submitted to Congress by 2026. The law also provides \$50 million in funding to carry out the pilot program.

IIJA identifies three key objectives for the national VMT-fee pilot:

- Test the design, acceptance, implementation, and financial sustainability of a national motor vehicle per-mile user fee.
- Address the need for additional revenue for surface transportation infrastructure and a national motor vehicle per-mile user fee.

- Provide recommendations relating to the adoption and implementation of a national motor vehicle per-mile user fee.

IIJA identifies five specific parameters for the national VMT-fee pilot:

- Provide different methods that volunteer participants can choose from to track motor vehicle miles traveled.
- Solicit volunteer participants from all 50 States, the District of Columbia, and the Commonwealth of Puerto Rico.
- Ensure an equitable geographic distribution by population among volunteer participants.
- Include commercial vehicles and passenger motor vehicles.
- Use components of and, where appropriate, coordinate with the States that received a grant under section 6020 of the FAST act (23 U.S.C. 503, Public Law 144-94) and eligible entities that received a grant under section 13001 of IIJA (Strategic Innovation for Revenue Collection).

The purpose of this report is to inform the implementation of the national VMT-fee pilot. The intent is not to evaluate the merits of a VMT fee but to inform how USDOT assembles the legislatively mandated pilot itself. At the conclusion of the five-year pilot, Congress needs to be able to decide to either to continue to pursue a national VMT fee or to pursue other options.

1.1 Methodology

To inform this research, Eno assembled a National VMT-Fee Pilot Research Advisory Panel of with voluntary members from the public, private, non-profit, and academic sectors, with experience in transportation policy, finance, VMT-fee pilot administration, automotive and trucking, tolling, and more.

Members of this group served as a source of knowledge and expertise, helped identify additional experts for research interviews, and reviewed work products for accuracy. Participation in the group does not mean endorsement of the final products, and not all members agreed with all parts of this document. Eno carefully considered input from all members as well as other individuals who were not part of the advisory group when developing the analysis and recommendations. Any remaining errors are those of the authors.

After initial conversations with stakeholders, Eno reviewed existing data, literature, and other written material to examine the history of the HTF and context for user-fees in the

United States. The research team then examined the existing VMT-fee pilots and programs both in the United States and abroad to garner best practices and to better understand their progress.

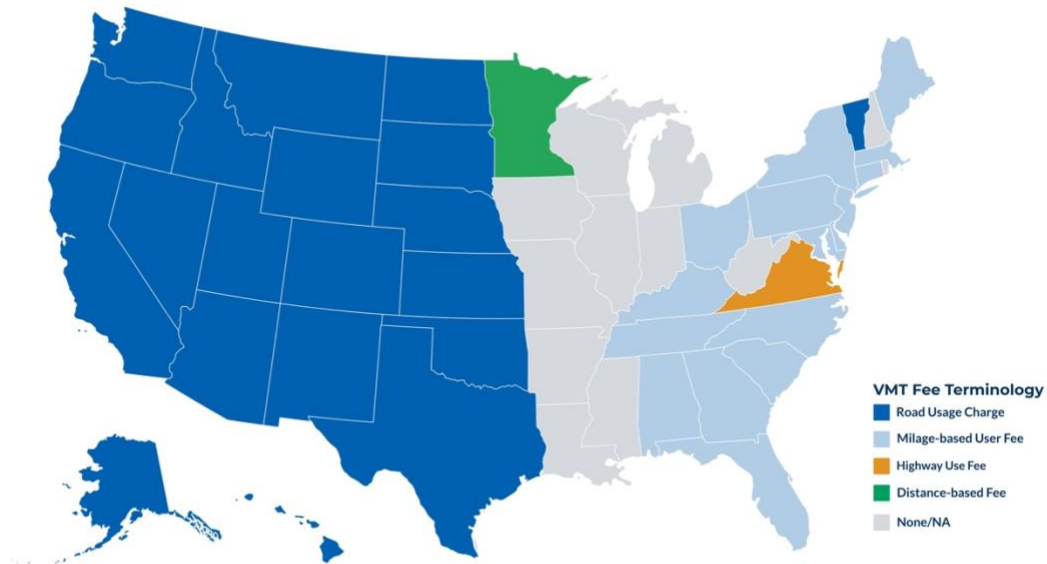
Once the baseline was established, Eno considered the application of a VMT-fee pilot at the national level. While many elements have been studied through the state pilots, there are additional complexities that are introduced with a federal program. To address these, Eno convened four expert workshops on the topics of (1) Trucking and Commercial Vehicles, (2) Interoperability, (3) Data, and (4) Recruitment, Public Relations, and Enforcement and Compliance. The participants were chosen for their proximity and experience to each of the topics, and their affiliations are listed below:

AECOM	Oregon Department of Transportation
American Trucking Associations	PACCAR
California Department of Transportation	PRR, Inc.
Cambridge Systematics	Texas Transportation Institute
Ernst & Young	The Eastern Transportation Coalition
General Motors	Transurban
International Bridge, Tunnel & Turnpike Assn.	United Parcel Service
ITS America	Via
International Fuel Tax Administration	Virginia Department of Motor Vehicles
New Road Consulting	Washington State Transportation Coalition
North Carolina Department of Transportation	WSP

Based on the discussions in the expert workshops and the previous research, with the help of the advisory panel, Eno created a set of goals for the national pilot. Finally, the research team put forward a series of recommendations to help achieve these goals.

In working with stakeholders and experts from around the country, it is clear that there is not a consensus on terminology for the fee. *Mileage-based user fee* (MBUF) is commonly used on the east coast (by organizations such as the Mileage-Based User Fee Alliance and The Eastern Transportation Coalition), while *road usage charge* is commonly used on the west coast (by organizations such as RUC America). Other terms include *highway use fee* (HUF) in Virginia, and *distance-based fee* (DBF) in Minnesota. See Figure 1.

FIGURE 1: STATE VMT-FEE TERMINOLOGY MAP



Note: States that are members of the Eastern Transportation Coalition and RUC America are labeled based on those regional organization preferences, unless they have released their own independent reports using a different term.

Even among those who use ‘RUC’, there is disagreement as to what specifically it means. Road *user* charge is used in most other countries, while road *usage* charge is used in the United States. This discrepancy is a result of different applications: in the United States, RUC is being explored as a dedicated revenue raiser for transportation infrastructure, while in most other countries, RUC is implemented most commonly as an incentive for behavior change (as a congestion charge or a climate tax), with the revenues collected going into the general fund to supplement funding across government.

For the purposes of this report, the research team elected to use the term ‘VMT fee’ to refer to charging drivers by the number of miles driven. ‘VMT fee’ is a neutral term that does not show a preference for the commonly used terms of RUC and MBUF. The decision on terminology for the national pilot is an important one, and this report refrains from preempting it.

2.0 Federal Excise Taxes as Proxies for Road Usage

2.1 The User-Pay Paradigm

The User-Pay Paradigm is covered in depth in Appendix B of this report. Full citations are given there.

In the United States, instead of paying for transportation programs out of general revenues or borrowing, the trend in state government (since the early 20th Century) and at the federal level (since the 1950s) has been to charge special taxes or fees on the users of transportation systems, segregate that money from the rest of the government budget, and dedicate that money solely to spending on the transportation systems used by those taxpayers.

For spending on roads and bridges, this “user-pay paradigm” evolved in stages, initially at the state level. Tax theorists broke these user taxes and fees into three “structures” as follows.

- *First structure – taxing the existence of the vehicle.* Automotive registration fees, first levied in New York in 1901, were adopted by all states by 1915 and eventually made annual (not permanent) and used as a revenue source.
- *Second structure – taxing the fuel on which the vehicle runs.* Oregon, followed quickly by New Mexico and Colorado, adopted a gasoline tax in 1919, specifically to support road spending. By 1929, all 48 states had adopted motor fuel taxes, which showed great stability as a revenue source during the Great Depression and quickly became the primary source for state road spending.
- *Third structure – taxing the use of the vehicle.* Traditionally confined, at the state level, to commercial vehicle use, various taxes on weight, weight-miles traveled, ton-miles carried, or gross receipts were used in over half of the states after World War II. Today, that has dropped to just four states (Kentucky, New Mexico, New York, and Oregon), which levy weight-mile taxes on commercial vehicles.

At the federal level, Congress enacted a national policy in 1951 (still on the books and enforced by the Office of Management and Budget) encouraging the financing of special government benefits via user fees whenever possible. In 1956, the Highway Revenue Act increased the existing motor fuels taxes and other taxes on vehicles and components, added a new annual tax on heavy truck use, and deposited the proceeds in a new Highway Trust Fund to segregate those receipts from general revenues for the first time. That Trust Fund paid for all Interstate Highway System construction from fiscal year 1957 to its completion, as well as the rest of federal-aid highway spending until the Trust Fund first became partially insolvent in 2008.

The Constitution, as interpreted by the Supreme Court on several occasions, draws a distinction between “taxes” (levied by the sovereign power of the government to raise revenue) and “fees” (the proceeds of voluntary, business-like transactions). The current motor fuels and trucking industry excise taxes going into the Highway Trust Fund are clearly “taxes” from a legal point of view, but from an economic viewpoint, these taxes can be grouped with bona fide user fees (like aviation security fees or pipeline safety fees) under the overall rubric of “user charges.”

2.2 History of Federal Taxes on Motor Vehicles, Products, Fuel, and Use

The 20th Century saw three great waves of new federal excise taxes:

- 1917-1919: to prepare for and wage World War I and pay down war debt.
- 1932: to balance the budget at the start of the Great Depression under President Hoover.
- 1941-1945: to prepare for and wage World War II.

The "user-pay" paradigm never entered into any of these debates. Most of the excise taxes were viewed by Congress as ways to raise revenues on items that were not "essentials of life." The gasoline tax, first levied in 1932, was a tax on an essential, but it was so essential that the state gasoline tax receipts were holding up much better than income taxes during the Great Depression, and there was nothing else Congress could think of to raise the level of revenues they thought necessary.

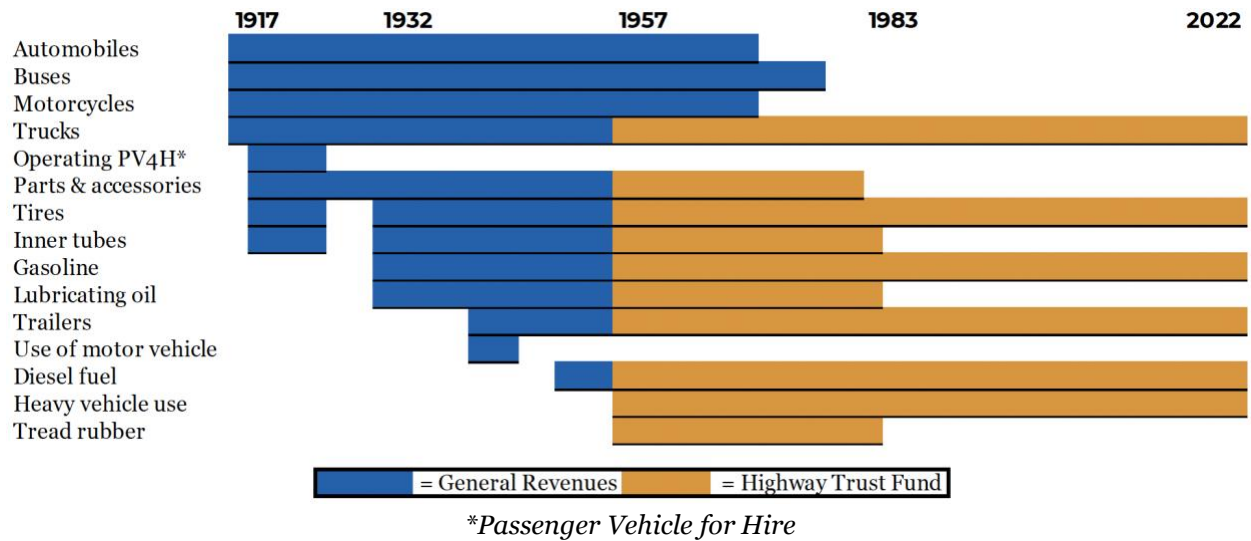
Congress has levied fifteen separate excise taxes related to road use over the years – thirteen on products, and two on the act of using public roads. They are listed by the year of their initial levy. Not all of these taxes were redirected from the General Fund to the HTF in 1956.⁹

- **Automobiles (1917)** – a sales tax on the manufacturer’s sales price of a new automobile, ranging from 3 percent to 10 percent. Never attributed to HTF; repealed in 1971.
- **Buses (1917)** – a sales tax on the manufacturer’s sales price of a new bus, ranging from 3 percent to 10 percent. Never attributed to HTF; repealed in 1978.
- **Motorcycles (1917)** – a sales tax on the manufacturer’s sales price of a new motorcycle, ranging from 3 percent to 10 percent. Never attributed to HTF; repealed in 1971.
- **Trucks (1917)** – includes both single-unit trucks and the tractor portion of a combination vehicle; a sales tax on the manufacturer’s sales price of a new truck,

ranging from 3 percent to 12 percent. Repealed in 1926 and then reinstated in 1932. Attributed to HTF beginning July 1, 1956; still on the books at 12 percent.

- ***Operating or renting passenger automobiles for hire (1919)*** – annual occupational tax paid per vehicle, based on passenger capacity (\$10 per year per vehicle for up to 7 passengers and \$20 per year per vehicle for over 7 passengers). Repealed in 1926.
- ***Parts and accessories for automobiles and trucks (1919)*** – manufacturer’s excise tax of between 2.5 and 8 percent. Attributed to HTF starting in 1966; repealed in 1983.
- ***Tires (1919)*** – manufacturers excise tax originally levied on all tires at a rate between 2.5 and 5 percent of price and then repealed in 1926. Levied again in 1932 as a weight-based tax on all tires starting at 2.25 cents per pound and eventually increasing to 10 cents per pound. Starting in 1983, tires weighing less than 40 pounds are exempt from tax and a graduated weight-based tax is in place for heavier tires. Attributed to the HTF since 1956; still on the books.
- ***Inner tubes (1919)*** – manufacturers excise tax originally levied on all tubes at a rate between 2.5 and 5 percent of price and then repealed in 1926. Reinstated in 1932 as a weight-based tax ranging from 4 to 10 cents per pound over time. Attributed to the HTF starting in 1956; repealed in 1984.
- ***Gasoline (1932)*** – manufacturers excise tax ranging from 1 cent per gallon to 18.4 cents per gallon over time. Now includes gasohol. Attributed to HTF starting in 1956; still on the books at 18.4 cpg, of which 18.3 cpg goes to the HTF.
- ***Lubricating oil (1932)*** – manufacturers excise tax on all types of lubricating oil 1932-1978 and highway oil use only from 1978-onward, ranging from 4 to 6 cents per gallon. Dedicated to the HTF starting in 1966; repealed in 1983.
- ***Trailers (1941)*** – manufacturers excise tax on trailers for highway use ranging over time from 5 percent to 12 percent of original price. Attributed to HTF starting in 1956; still on the books at 12 percent.
- ***Use of a motor vehicle on public highways (1942)*** – a flat \$5 annual tax on the use of a motor vehicle, paid by the registrant. Repealed in 1946.
- ***Diesel and special fuels (1951)*** – manufacturers excise tax varying from 2 to 24.4 cents per gallon. Now also include biodiesel. Attributed to HTF starting in 1956; currently on the books at 24.4 cpg, of which 24.3 cpg goes to the HTF.
- ***Heavy vehicle use (1956)*** – annual tax on the use of a motor vehicle over 26,000 pounds gross weight. Taxes are weight-based and currently capped at \$550 per year. Dedicated to the HTF from its inception, still on the books today.
- ***Tread rubber (1956)*** – manufacturers excise tax varying from 3 to 5 cents per pound. Attributed to HTF starting in 1956; repealed in 1984.

FIGURE 2: FEDERAL EXCISE TAXES RELATED TO HIGHWAY TRANSPORTATION, YEARS 1917-2022



2.3 Federal Motor Fuel Taxes

A federal excise tax on gasoline as a motor fuel was first levied by the Revenue Act of 1932, for general revenues, as a means of balancing the federal budget during President Hoover’s last year in office, amidst the Great Depression. The House Ways and Means Committee recommended a national sales tax, but the House struck that from the bill, and the bill’s floor managers hastily threw together a series of random-seeming excise taxes to fill the amount of revenue that would have been filled by the sales tax, most notably a temporary 1 cent per gallon excise tax on gasoline. That temporary tax was, of course, never allowed to expire, eventually being increased to 1.5 cents per gallon in 1940 and 2 cents per gallon in 1951 (the same time that the highway use of diesel fuel was first taxed, at the same rate).

Before 1956, there was no formal linkage between federal motor fuel excise tax receipts and federal spending on roads. However, it was an amazing coincidence that in fiscal year 1933, the first year of the federal gasoline tax, its receipts totaled \$124.9 million, while the new contract authority apportioned to states under the federal-aid highway program for that year totaled \$125 million. As early as 1937, the Treasury Department was internally tracking the relationship between gasoline tax receipts and total federal spending on roads, as well as correlating the relationship between federal gas taxes attributed to a state and the federal-aid apportionments received by the state.¹⁰

By 1944, Members of Congress were noting during debate on the postwar highway funding reauthorization bill that "For the fiscal year 1942 the receipts from Federal

excise taxes on motor vehicles, gasoline, oil, and so forth, totaled \$626,327,000, which is over \$126,000,000 more than the annual amounts authorized in the bill under consideration."¹¹

A true equality between estimated future gasoline tax receipts and authorized future federal-aid highway funding was achieved in the 1954 highway law, about which President Eisenhower said, "The public will welcome, I am sure, the fact that funds equivalent to revenue from Federal gasoline taxes will now be used entirely for the improvement of the nation's highways."¹² But the taxes and spending were still part of, and fungible with, general revenues.

All that changed with the Highway Revenue Act of 1956, which increased the motor fuel taxes from 2 cents per gallon to 3 cents per gallon and transferred the proceeds of the taxes (along with several other user taxes, including those specific to the trucking industry) into a new HTF, from which all future expenses of the federal-aid highways program, including the construction of the new Interstate Highway System, would be paid.

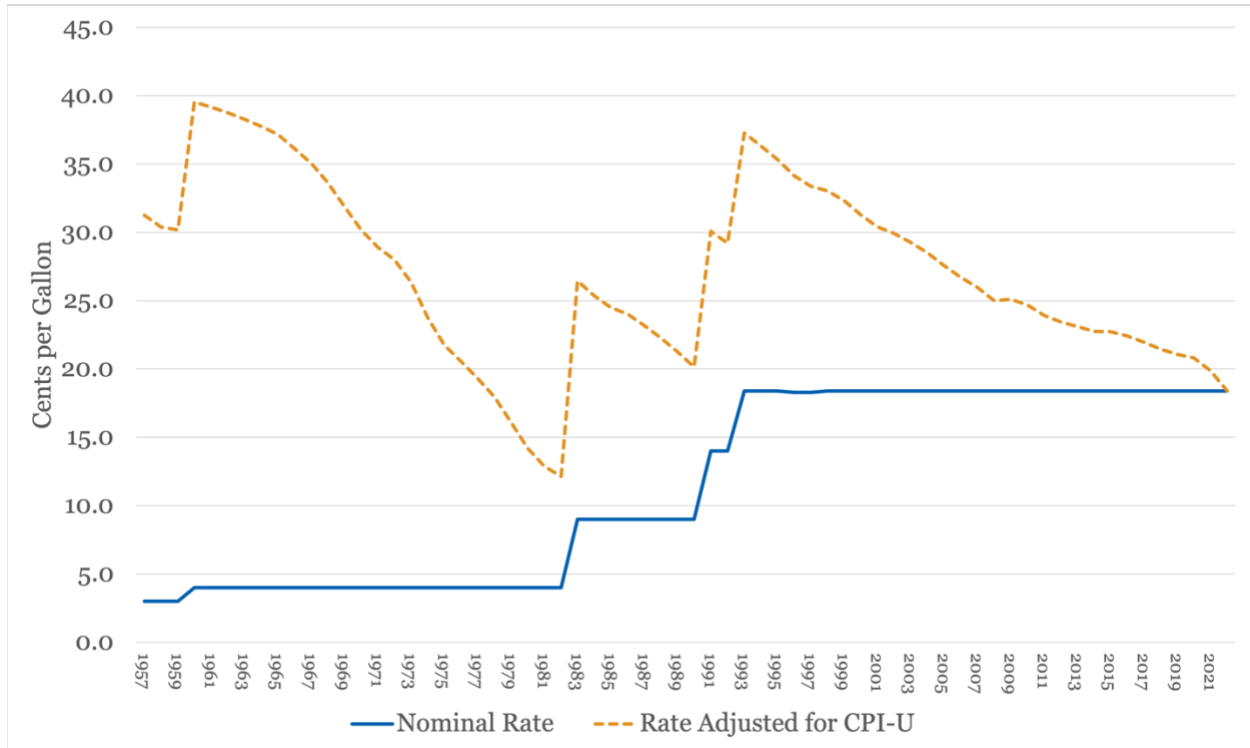
This formal linkage with spending forced Congress to increase the motor fuels taxes by another cent per gallon in 1959 to keep the HTF solvent. The tax rates stayed at four cents per gallon for 23 years before Congress increased them to nine cents per gallon in 1982 to make up for lost buying power due to the Great Inflation (and to dedicate a fixed portion of the tax to mass transit spending).

The last time that the motor fuels tax rates were raised specifically to increase transportation spending was 1982 (caveat: see discussion of the diesel tax differential under "Federal Trucking Excise Taxes" below). Instead, the taxes were increased for deficit reduction, and those increases dedicated to the General Fund, in 1990 (by five cents per gallon) and in 1993 (by an additional 4.3 cents per gallon), though in both instances, the full amount of the tax increases was transferred to the HTF after the five-year deficit reduction deals expired. Federal motor fuel taxes today are levied at the same nominal cent-per-gallon rates that they were in the fall of 1993, almost 30 years ago.

Any financial comparison between today and decades past must account for inflation. When looking at how the gas tax is perceived by the public, it is probably best to use entire amount of the tax (HTF and General Fund), and use the Consumer Price Index (CPI) (the official measure of the cost of living for an average household) as the metric. By this measure, the increase of the tax to 4 cents per gallon in late 1959 was the equivalent of 39.5 cents tax today. This slid via steady inflation until it was the equivalent of 12.1 cents (in today's currency) in 1982 before being increased again. The

last increase, in 1993, took it back to a 37.3 cent equivalent, before the inflation-adjusted line and the nominal line meet at today's 18.4 cents per gallon.

FIGURE 3: FEDERAL GASOLINE EXCISE TAX RATE, 1957-2022

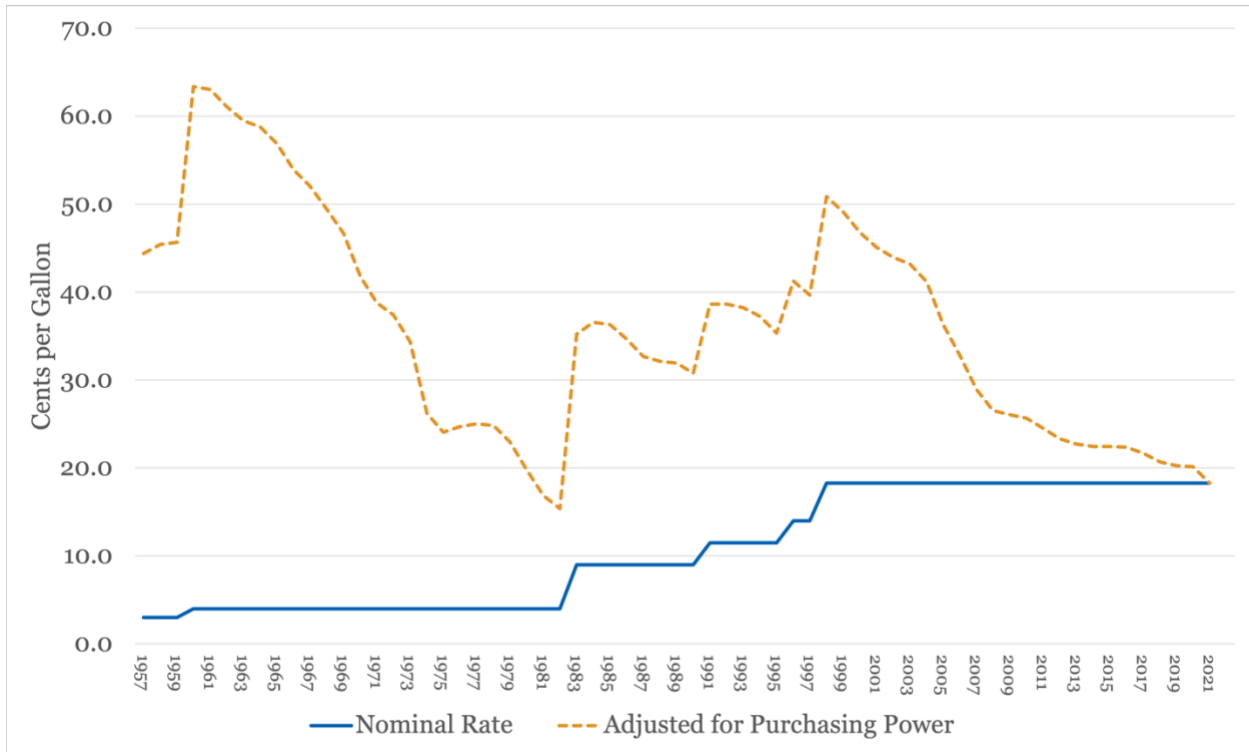


Nominal Total Rate vs How it Feels to Consumers (Cost-of-Living Inflation)

When looking at finances from the government's side of things, it is better to look at what the government can do with the money. In this case, we do not look at the entire gasoline tax, because a large chunk of it was diverted to the General Fund (not the HTF) from 1990-1997 and because one-tenth of a cent of today's tax goes to the Environmental Protection Agency to clean up abandoned service stations. So we only look at the portion of the gas tax that goes to the HTF (the "beneficiary taxation" user charge portion), and instead of using CPI, we use the National Income and Product Accounts producer price index for state and local government spending on highways and streets.

This analysis, shown in Figure 4, shows that 1960's 4 cents per gallon had the buying power of 63.4 cents in 2021 currency before beginning its long slide. When the 1993 tax increase was finally transferred back to the HTF, in 1998, that 18.3 cents was the equivalent of 50.9 cents in 2021 currency. Today, both lines have again met back at the current nominal rate of 18.3 cents per gallon.

FIGURE 4: FEDERAL HTF GASOLINE EXCISE TAX RATE, 1957-2021

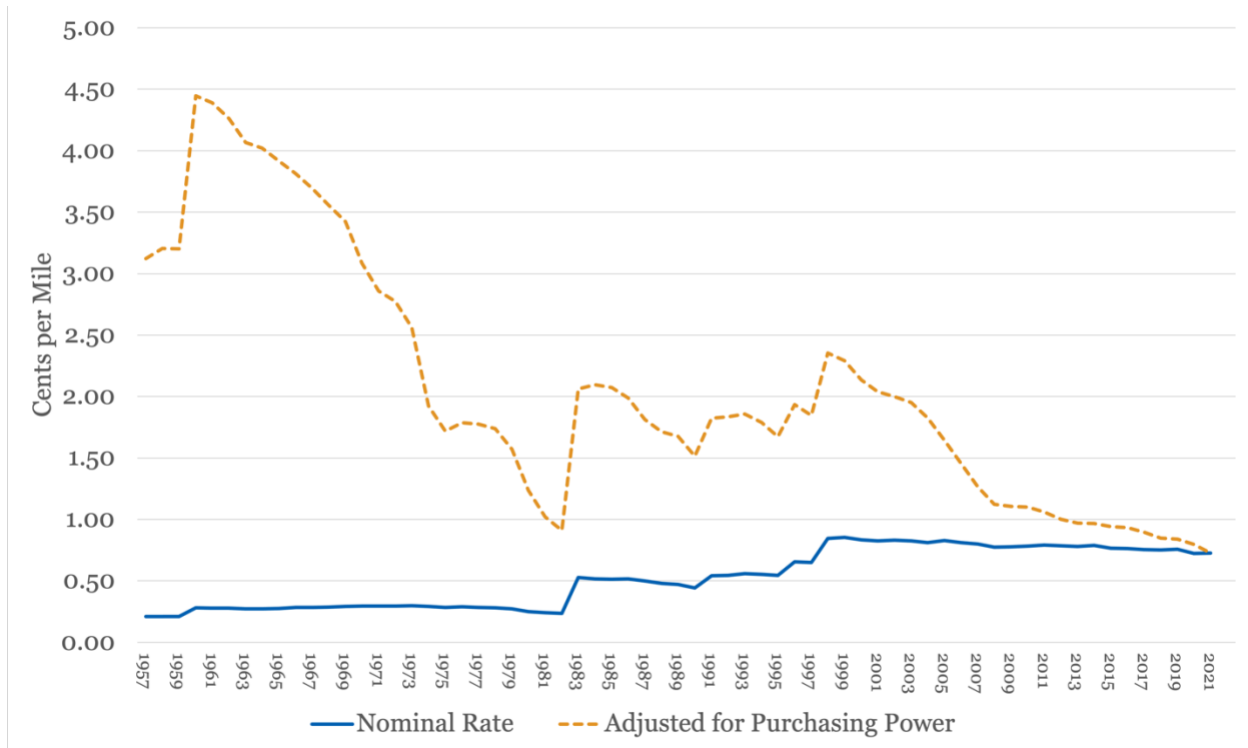


Nominal Rate vs Purchasing Power (NIPA Producer Price Index)

Since 1957, taxing gasoline has been a proxy for the taxation of road use, and one can easily convert gasoline taxes into a cents-per-mile equivalent using the information the FHWA reports annually in the Highway Statistics series (Table VM-1). For passenger cars (as originally defined, now called "light-duty vehicles, short wheelbase"), today's gasoline tax equates to a per-mile charge of around 0.73 cents per mile. Using the HTF-only gasoline tax looking back, the nominal per-mile charge equivalent peaked in 1998 at 0.85 cents per mile, with increasing fuel efficiency lowering the average since then.

When indexed for lost buying power, the equivalent per-mile charge peaked at 4.44 cents per mile in 1960 and had dropped to 0.91 cents per mile in 2021 currency just before the 1982 tax increase. The recent peak in 1998 was 2.35 cents per mile, with both construction cost inflation and increasing fuel economy eating away at the number since then.

FIGURE 5: HTF GASOLINE TAX RATE AS PASSENGER CAR CENTS-PER-MILE EQUIVALENT, 1957-2021

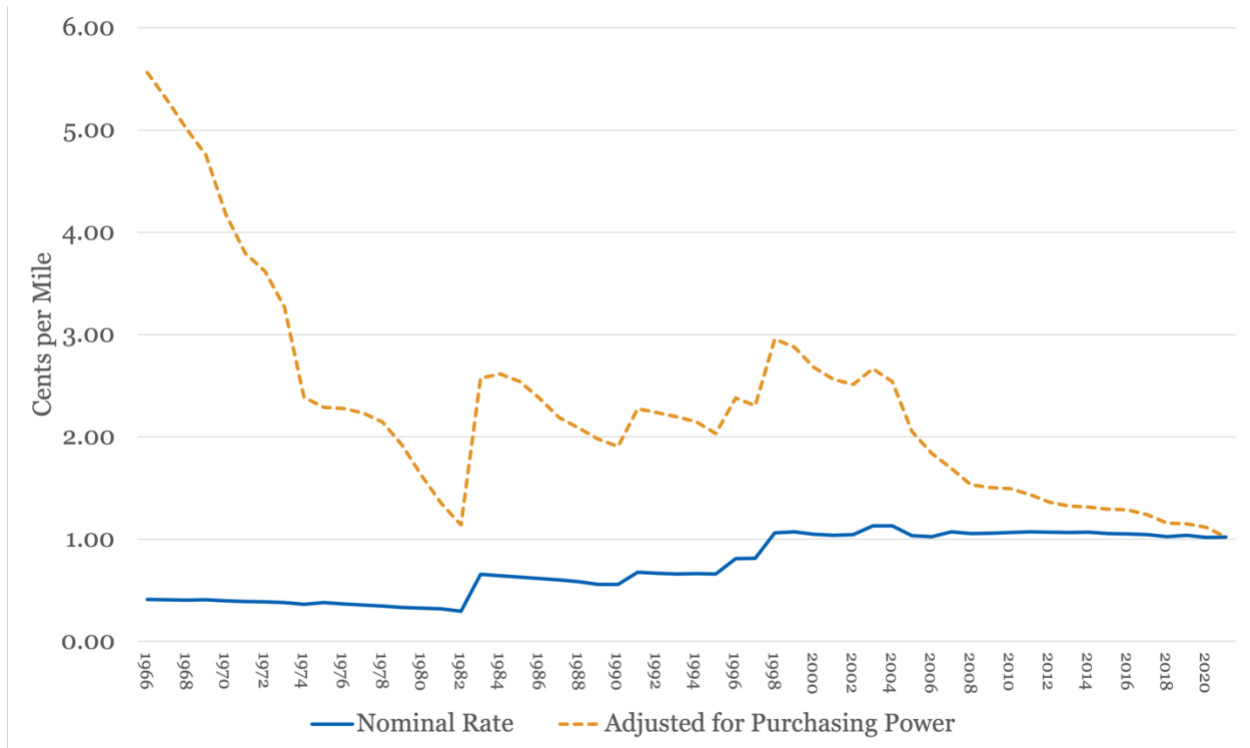


Nominal Rate vs Purchasing Power (NIPA Producer Price Index)

Before 1966, FHWA considered pickup trucks, passenger vans, and the rare sport-utility vehicle to be trucks, and their data were combined with all other kinds of trucks in the reporting. Started in 1966, they were recorded as "other 2-axle, 4-tire vehicles" and are now "light-duty vehicles, long wheelbase." Such vehicles have never been as fuel-efficient as passenger cars, so the gasoline tax is a larger cent-per-mile equivalent for them.

Starting in 1966, the cent-per-mile equivalent of the 4-cent gasoline tax was 0.41 cents per mile nominal, but 5.56 cents per mile when adjusted for lost buying power in 2021 currency. The 1998 recent peak was 1.06 cents per mile nominal, 2.96 cents per mile adjusted. The latest total, for 2021, was 1.02 cents per mile.

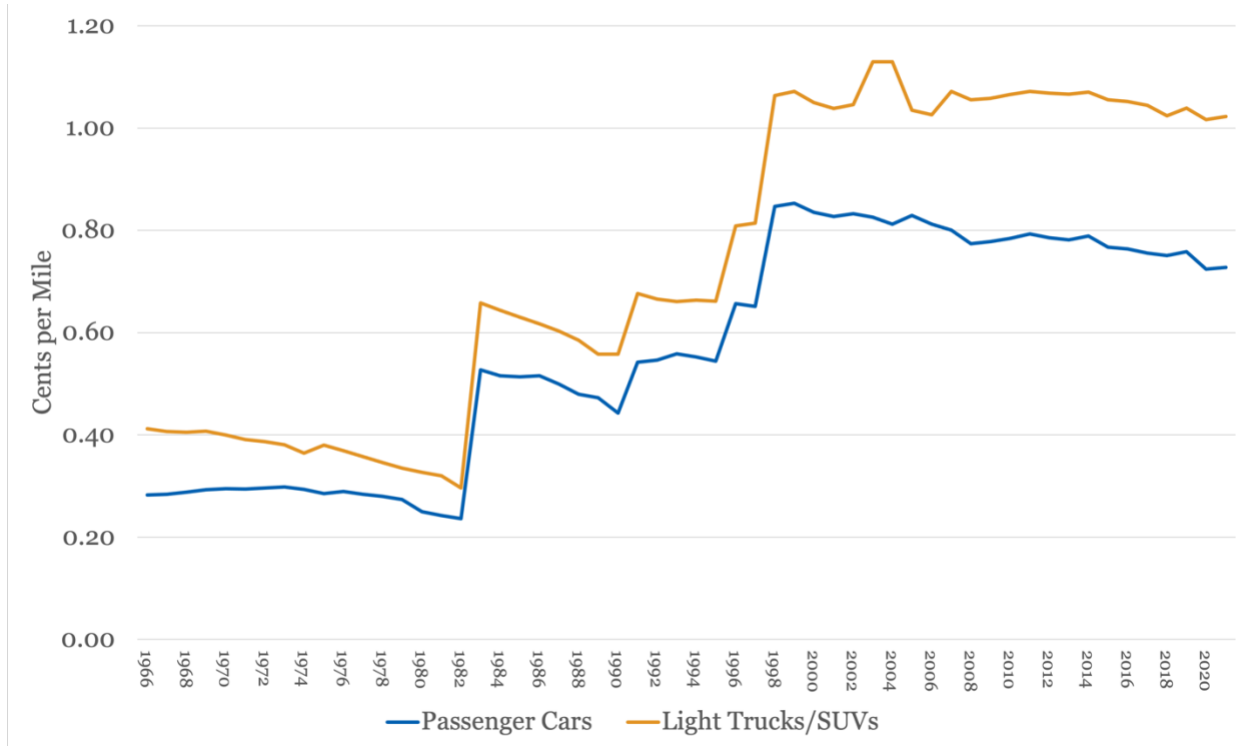
FIGURE 6: HTF GASOLINE TAX RATE AS SUV/LIGHT TRUCK CENT-PER-MILE EQUIVALENT, 1966-2021



Nominal Rate vs Purchasing Power (NIPA Producer Price Index)

The nominal cent-per-mile equivalent of the HTF portion of the federal gasoline tax for both types of vehicles can be compared in the chart below.

FIGURE 7: HTF GASOLINE TAX RATE AS CENT PER MILE EQUIVALENT, 1966-2021



Nominal Rate for passenger cars and for light trucks/SUVs

Since 1984, the highway use of diesel fuel has been taxed a rate 6 cents per gallon higher than gasoline (currently 24.4 cents per gallon, 24.3 cents of which is deposited in the HTF.) The majority of diesel fuel in highway use is consumed by the long-haul trucking industry – specifically, "combination vehicles" (the "tractors" in tractor-trailer). The FHWA overhauled the methodology for its mileage estimates for these vehicles in 2007 so as to make new estimates incompatible with old estimates. Since then, combination vehicles have, in the aggregate, maintained average fuel economy of between 5.8 and 6.2 miles per gallon (mpg), with the most recent estimate (2021) being 6.0 mpg.¹³

But FHWA reporting does not break estimated mileage down by truck type or fuel type. The Environmental Protection Agency does its own modeling with a different methodology that does estimate those differences. Their latest modeling, for 2022, estimates that diesel-powered long-haul (Class 7 and 8) trucks got an estimated 6.2 mile per gallon in 2022 (very close to the FHWA estimate for 2021), which translated into a 3.92 cent per mile equivalent tax into the HTF.¹⁴ However, the tax on fuel used by commercial trucks as a cent-per-mile proxy is in addition to the other excise taxes specifically on the trucking sector, discussed in section 3.2.

The Environmental Protection Agency (EPA) also estimates fuel efficiency for the existing fleet of medium-duty trucks (Class 4 to 6) by type of fuel used. The current (2022) estimates show that such trucks are currently paying a 2.64 cents-per-mile diesel fuel tax equivalent and a 2.73 cents-per-mile gasoline fuel tax equivalent to the HTF.

TABLE 1: CURRENT HTF FUEL TAX RATES, IN CENTS PER MILE EQUIVALENT (2021 AVERAGES)

Vehicle Type	Cents/Mile Equivalent
Passenger cars	0.73 cents/mile
SUVs/light trucks	1.02 cents/mile
<i>Light-duty average</i>	<i>0.80 cents/mile</i>
Class 4-6 trucks (diesel)	2.64 cents/mile
Class 4-6 trucks (gasoline)	2.73 cents/mile
Class 7-8 trucks (diesel)	3.92 cents/mile

Source: FHWA 2021 for LDV, EPA 2022 for trucks

2.4 Federal Trucking Excise Taxes

The Highway Revenue Act of 1956 placed the proceeds of the federal gasoline and diesel excise taxes in the new HTF (increased by 1 cent per gallon each), as well as six trucking industry taxes: the tractor-trailer sales tax (increased from 8 percent of new sales price to 10 percent, of which half was to go to the HTF), the tire tax (increased), the inner tube tax (also increased), a new tax on tread rubber, and a new annual tax on the use of the heaviest trucks.

The 1956 law also commanded the Commerce Department to conduct a study and report to Congress recommendations on how to ensure "an equitable distribution of the tax burden among the various classes of persons using the Federal-aid highways or otherwise deriving benefits for such highways."¹⁵

That study was completed in January 1961 (H. Doc. 54, 87th Congress), and President Kennedy used its recommendations to propose that trucking taxes be increased to fill a new projected Interstate highway construction revenue gap instead of another half-cent

increase in the gasoline tax. His message to Congress said that "Practically all of the increase in revenues (replacing the general 1/2¢ rise in gas tax) would come from the heavier trucks that use diesel fuel and weigh over 26,000 lbs. when loaded. This is only fair. Indeed, technical experts in the Bureau of Public Roads advise me that even this increase would not charge heavy trucks their fair share of the cost of this program."¹⁶

(Although some passenger cars and light-duty vehicles also use diesel fuel, diesel is primarily used by the commercial trucking sector (and buses, though mass transit buses and school buses are allowed to purchase diesel tax-free). Politically speaking, the tax committees of Congress have viewed the diesel tax, the truck-tractor-trailer excise tax, the heavy tire tax, and the heavy vehicle use tax (HVUT) as collectively fungible taxes on the trucking sector.)

Congress agreed, but after pushback from the trucking industry, they deleted Kennedy's proposed diesel fuel increase, lowered his proposed increase in the heavy truck use tax, and instead devoted the remaining half of the truck-tractor-trailer sales tax from the General Fund to the HTF.

By 1982, USDOT had finished another highway cost allocation study. It found that small cars were being slightly undertaxed, motorcycles and combination trucks were being seriously undertaxed, and that single-unit trucks were being significantly overtaxed, relative to the benefits they derived from the highway program.¹⁷ The Transportation Department released its revenue plan in late 1982 and defended it at a Ways and Means Committee hearing. The plan called for a 117 percent increase in motor fuel taxes (gas and diesel getting equal cent-per-gallon increases), a 289 percent increase in the HVUT to make heavy trucks pay more, and a decrease in the tire tax focused on tires used by single-unit trucks. USDOT stressed that this plan, in particular, would make heavy combination trucks pay much closer to their fair share of the costs of road use.¹⁸

After quick debate, Congress enacted a new revenue plan that largely resembled the Administration's proposal. It envisioned that, by 1988, receipts from the increased motor fuel taxes would be 222 percent of their 1983 level, and that receipts from the increased HVUT would be 326 percent of their 1983 level. Other truck taxes, aimed at single-unit trucks, would decrease by 34 percent. (Most of the tax changes were to take effect immediately, but the HVUT increase was not to take effect until July 1, 1984.)¹⁹

However, despite the new tax structure lining up with the recommendations of the cost allocation study, the truckers resisted (particularly the owner-operators), who said that the new HVUT levels were unaffordable. By 1984, their protests by truckers caused Congress to lower the tire tax and HVUT and, in the same law, to increase the diesel tax

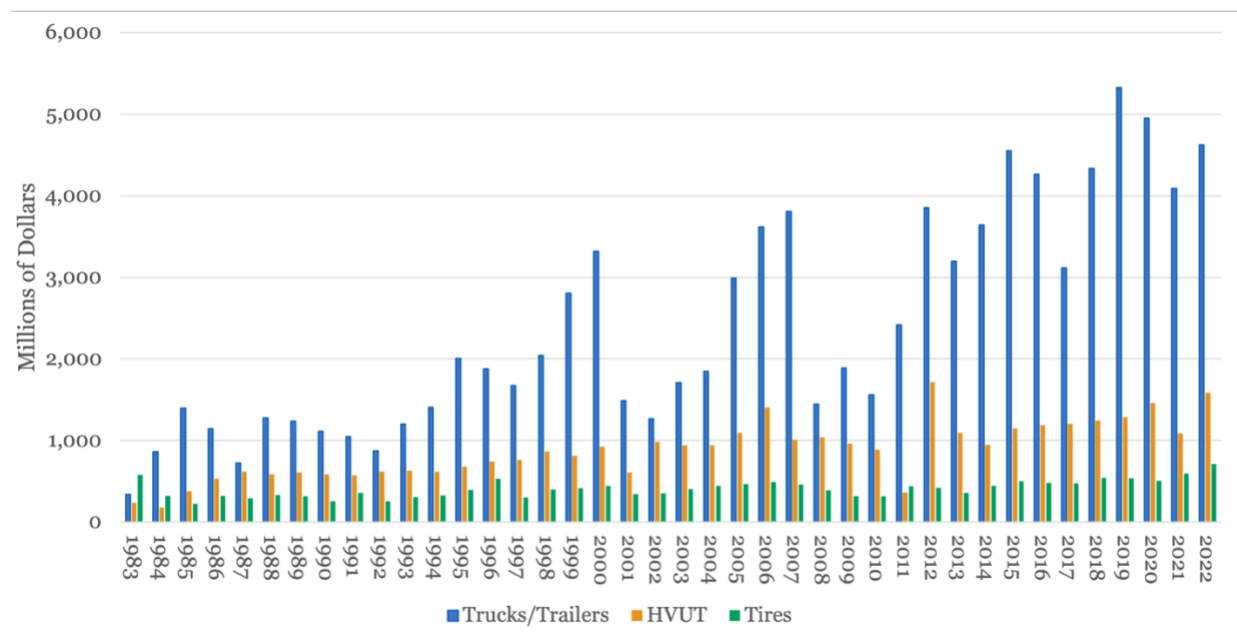
by six cents per gallon so as to recapture all of the trucking sector revenue lost by the tax reduction, making the changes as a whole revenue neutral.²⁰

Congress has not attempted to reconcile the highway user tax structure with cost allocation since 1982, and the last cost allocation study was completed in 1997 (although the IIJA has commissioned another study).

Since the current alignment of truck taxes took effect in 1983, the truck-tractor-trailer sales tax has become an increasing share of the total. This is because, alone amongst the highway user taxes, the truck sales tax has a built-in inflation adjustment, since it is a percentage of the sales price, and the sales price of a new truck keeps going up. (In addition, the tax is also levied on intermodal trailer chassis, the sales of which have skyrocketed as intermodal cargo containerization has grown.)

However, the receipts of this tax are also very volatile, because a lot of new truck sales are driven by new purchases by fleets in economic good times. The collections of that excise tax routinely rise or drop by 20 percent or more from year to year, with 7 year-to-year fluctuations of 50 percent or more since 1984, as seen in Figure 8.

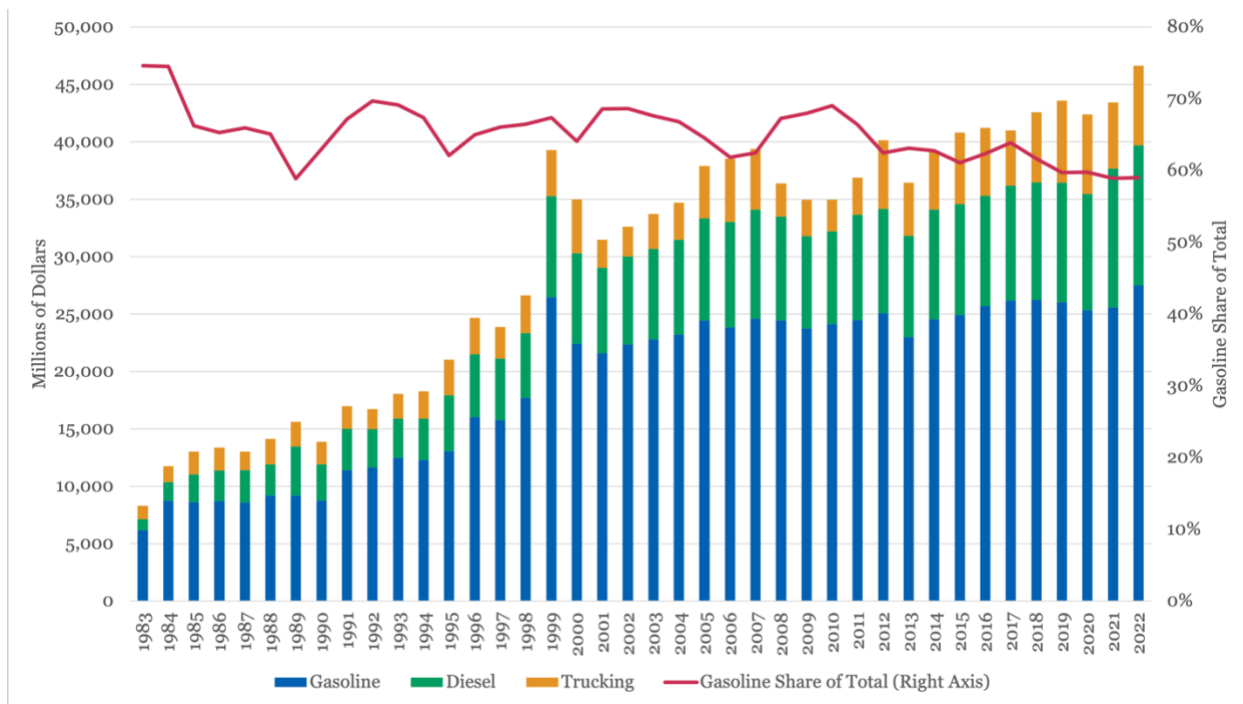
FIGURE 8: RECEIPTS FROM TRUCKING SECTOR TAXES, FY 1983-2022



3.0 Federal Highway Trust Fund

The HTF was established by the Highway Revenue Act of 1956 to receive the deposits of certain existing, increased, and new excise taxes on products related to road use (and, in one instance, on annual road use itself) and to provide a source from which spending accounts for federal-aid highways were to be drawn. The HTF received \$46.6 billion in net excise tax deposits in fiscal year 2022, an all-time high (though slightly inflated because of the IRS’s delayed processing of tax returns filed during the COVID-19 pandemic).

FIGURE 9: HIGHWAY TRUST FUND NET TAX RECEIPTS BY SOURCE, FY 1983-2022



The HTF served as a reliable mechanism for supporting federal spending on roads, bridges, highway safety and (later) mass transit from its inception until the late 2000s, when a period of insolvency crises began. Since running out of money in September 2008, the HTF has required the infusion of \$272 billion in special transfers from general revenues in order to stay solvent.[†]

[†] While the CBO cites this number as being over \$270 billion, but an Eno analysis found the precise number to be \$271.84 billion.

There are three underlying causes for the HTF's ongoing insolvency: increasing motor vehicle fuel economy, slower rates of annual increase in total vehicle-miles traveled, and the inability of the political system to match HTF spending to tax revenues.

3.1 Increasing Motor Vehicle Fuel Economy

In response to the OPEC oil boycott in 1973, Congress passed the Energy Policy and Conservation Act of 1975 (Public Law 94-163), section 301 of which directed the Secretary of Transportation to set standards mandating that the new passenger cars produced by each manufacturer in each year average to a certain minimum average fuel economy. These Corporate Average Fuel Economy (CAFE) standards were set by law at 18 miles per gallon for model year 1978 and were to rise to 27.5 miles per gallon for model year 1985 and afterwards.

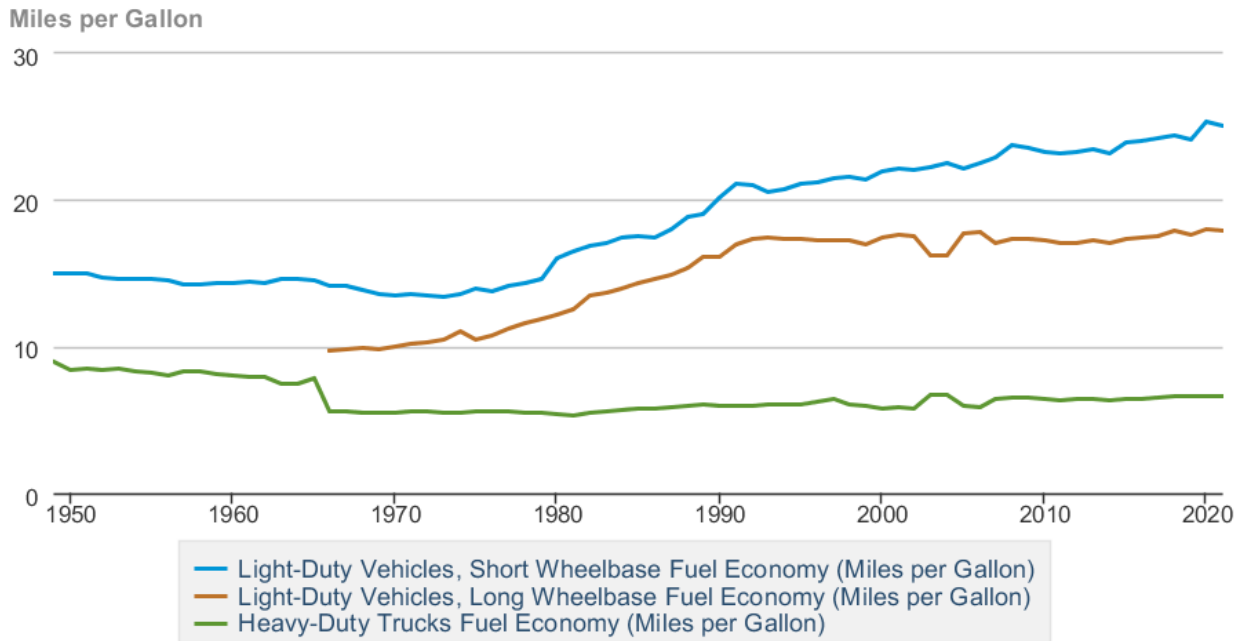
Pickup trucks were held to a lower mileage standard, but this gap inadvertently caused the growth of the sport utility vehicle sector – passenger vehicles that were, technically, trucks and thus could meet lower emissions standards.

Congress began increasing CAFE standards again in 2007, and the standards are no longer set in law but by USDOT regulation every few years.

Mandating increased fuel economy in new vehicles slowly increases the average fuel economy of the entire on-road fleet, but fleet turnover times are long. According to the 2017 National Household Travel Survey, the average passenger car on the road was 10.3 years old in 2017, and the average SUV 8.5 years old.²¹ Those averages have only increased since then, as new vehicles have gotten more expensive: S&P Global indicates the average age of passenger cars and SUVs in 2022 to be 13.1 years old and 11.6 years old, respectively, with an average combined fleet age of 12.1 years old.²²

By 2021, the national average fuel economy of all on-road passenger cars (now called "light-duty vehicles, short wheelbase") had increased to 25 miles per gallon, up from 20.5 m.p.g. in 1993 (the last time the gasoline tax rate was increased) and an increase of almost 90 percent since the OPEC oil boycott year of 1973, which first gave Congress the impetus for national fuel economy standards. Pickup trucks and longer SUVs (now called "light-duty vehicles, long wheelbase"), also subject to CAFE standards, had increased their average fuel economy by 70 percent from 1973-2021.

FIGURE 10: U.S. MOTOR VEHICLE AVERAGE FUEL ECONOMY, 1949-2021



Source: U.S. Energy Information Administration

The U.S. Department of Energy’s (DOE) 2023 Reference Case forecast projects that the average fuel economy of all on-road light-duty vehicles will increase by 50 percent by 2050, from 24.2 miles per gallon in 2022 to 36.1 miles per gallon in 2050.²³ This increase includes the increasing market penetration of electric vehicles (EVs), which at present do not pay any excise taxes into the HTF. The DOE projects that EV power usage will rise from 32 trillion Btu of energy in 2022 to 736 billion Btu in 2050.²⁴

Since that Energy Department forecast was issued, the Biden Administration has promulgated greenhouse gas emission rules that are intended to force the changeover to EVs even more quickly. These emission rules (unlike CAFE standards) also apply to heavy-duty trucks.

A new light-duty vehicle sold in 2022 with an internal combustion engine would pay about \$1,073 in gasoline taxes into the HTF over the course of its life:

$$(15,000 \text{ miles per yr.} \times 12 \text{ years of life} \times \$0.183 \text{ per gal. tax}) \div 30.7 \text{ mpg}^{\ddagger} = \$1,072.96$$

So every new EV that is purchased in lieu of an internal combustion engine vehicle takes roughly that much revenue, on average, out of the HTF in the long term.²⁵

[‡] 30.7 mpg is the EIA Reference Case 2022 for On-Road New Light-Duty Vehicle mpg for 2022.

3.2 Slower Rates of Increase in Vehicle-Miles Traveled

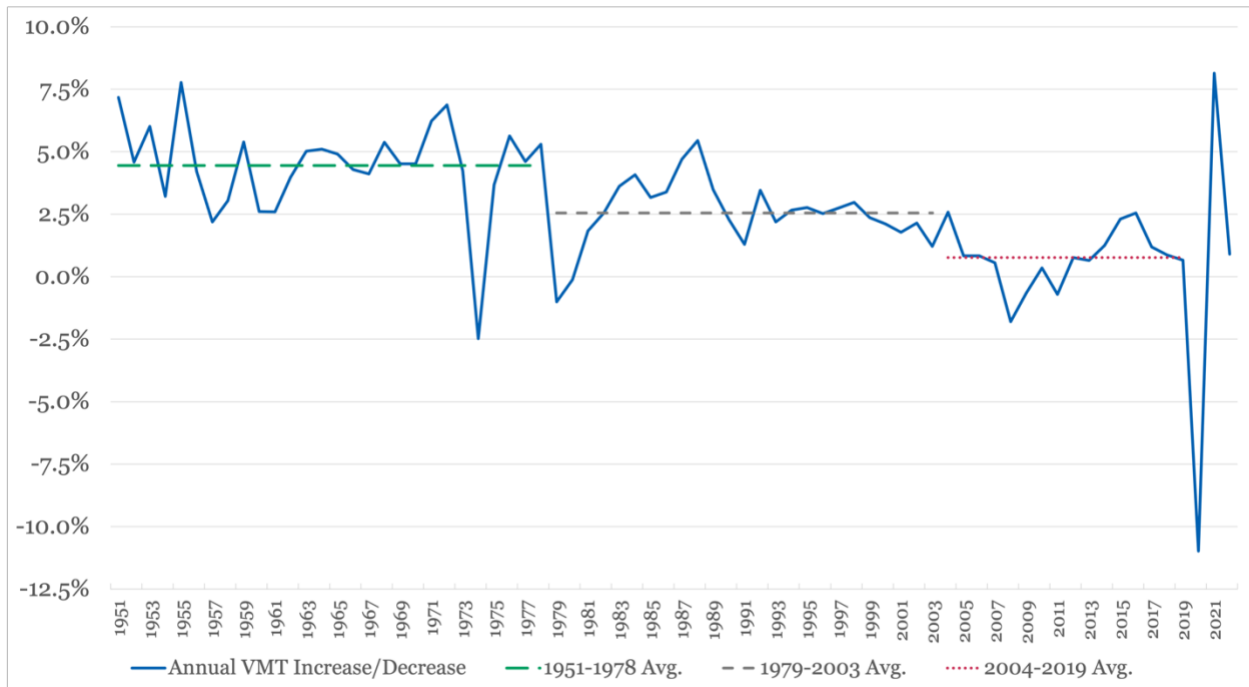
With a fixed cents-per-gallon tax on motor fuel consumption as the proxy for VMT, any increase in fuel economy obviously represents a decrease in amount of tax revenues paid per-mile. But the rate at which total miles driven on U.S. roadways increased each year has dropped significantly since the early days of the HTF model.

According to data from the Federal Highway Administration, during the period from 1951 to 1978, annual growth in U.S. VMT for all vehicles (including trucks and motorcycles) averaged 4.5 percent per year.²⁶ (VMT doubled from 1950 to 1966, and the 1976 total was triple the 1950 total.) This average survived the first great oil shock (OPEC) in 1973-1974, and VMT growth was back over 5 percent per year by 1976.

But the second great oil shock (Iran, 1979-1980) actually took more oil out of circulation for a longer period of time and represented a turning point in driver behavior. From 1979 to 2003, U.S. VMT only increased at an average rate of 2.5 percent per year, so total VMT in 2003 was only 1.9 times the total from 1979 (despite the relative increase in truck traffic caused by the advent of deregulation in 1980).

Finally, from the beginning of January 2004 to the end of June 2008, the price of crude oil more than quadrupled (WTI went from \$32.50 per barrel to \$140 per barrel).²⁷ This included the initial crossing of the psychologically-important \$4 per gallon gasoline rate.²⁸ From 2004 to the end of 2019, the annual rate of increase in total U.S. VMT has been just 0.8 percent per year, a rate at which it would take 90 years for VMT to double.

FIGURE 11: ANNUAL INCREASE/DECREASE RATE OF U.S. VMT
(ALL VEHICLE TYPES), 1951-2022



Over the next 30 years, the FHWA predicts that car/light truck/SUV VMT will increase by an average of 0.56 percent per year, single-unit heavy truck VMT will increase by an average of 3.37 percent per year, and combination truck VMT will increase by an average of 1.90 percent per year. Total average VMT growth for all vehicle types is projected to be 0.73 percent per year, a rate at which it would take VMT 99 years to double.²⁹

3.3 Inability of the Political System to Reconcile Trust Fund Spending with Revenues

From its earliest days, the HTF went through periods of balance buildup (receipts exceeding outlays) and balance spenddown (outlays exceeding receipts). A solvency crisis in 1959 led to a user tax increase, and highway user taxes were also increased in 1961, 1983, 1990, and 1993. But Congress has been unable to increase highway user tax rates since 1993 (though HTF receipts jumped in 1998 after a 1997 law transferred the 1993 tax increase from the General Fund to the HTF).

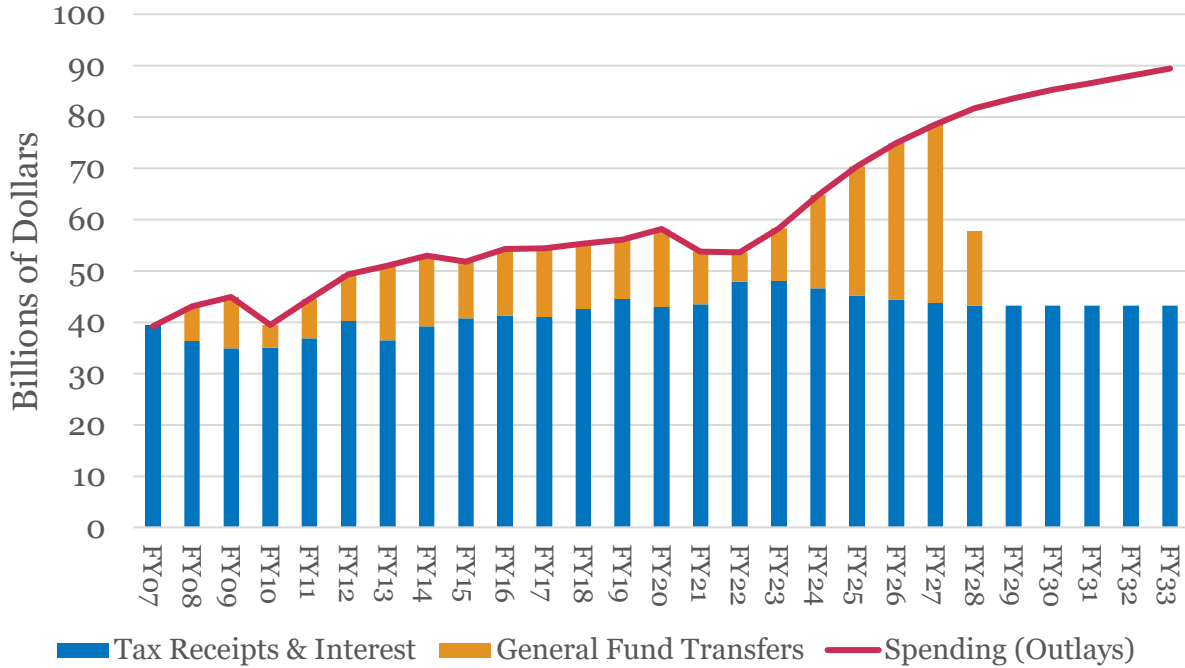
During the early part of that period, FHWA and its antecedent agency could act on their own to slow down the rate of new spending obligations to stave off an insolvency crisis. But the Impoundment Control Act of 1974, along with several federal court decisions, means that USDOT no longer has the ability to control HTF spending administratively,

even if that spending is clearly unsustainable and will force the HTF into insolvency in very short order.³⁰

As mentioned above, from 2004 to the onset of the COVID-19 pandemic in March 2020, VMT has only been growing at a rate that would double every 90 years. But the HTF has been on a rate to double its spending in 20 years, from 2007 to (projected) 2027.

Since it ran out of money in fall 2008, annual spending from the HTF averaged 126 percent of that year's tax receipts and interest over the 2008-2022 period. The nonpartisan Congressional Budget Office's (CBO) May 2023 baseline projections state that, at current spending levels (fiscal 2023 enacted plus annual inflation increases), and at current tax rates, the imbalance will get steadily worse, with HTF outlays exceeding 200 percent of receipts and interest by 2030. CBO estimates that the most recently enacted general fund transfers (the \$118 billion in the IIJA) will run dry mid-2028 and that over \$240 billion in additional revenue increases or general fund transfers will be necessary to maintain HTF solvency to the end of 2033.³¹

FIGURE 12: HIGHWAY TRUST FUND FY 2007-2022 (ACTUAL),
FY2023-2033 (CBO BASELINE)



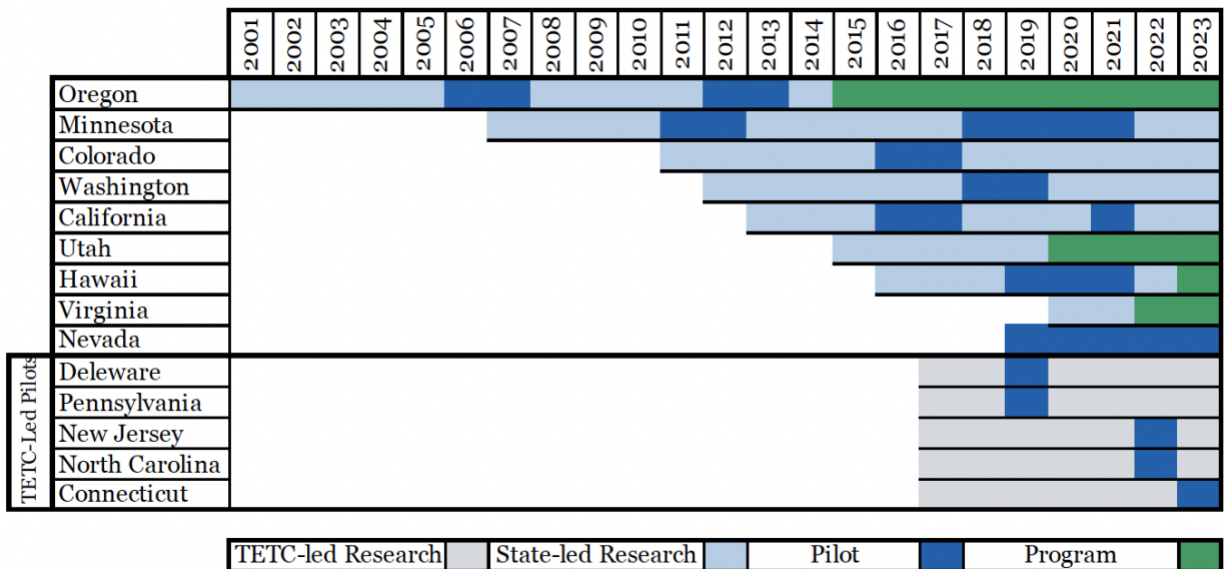
General Fund transfers shown in the year the transferred funds are spent.

CBO projects that, after a transition year in 2028, at baseline (current law plus inflation) spending levels, the HTF will have a \$40 billion revenue shortfall in 2029, and that shortfall will rise steadily each year until it reaches \$46 billion per year in 2032, the last year of the forecast.

4.0 Current VMT Fee Landscape

Starting in the early 2000’s, interest in VMT fees in the United States has grown significantly and includes research and pilot programs in 37 states and DC. Many of these pilot programs began or expanded with grant funding from the federal Surface Transportation System Funding Alternatives (STSFAs) program—a Fixing America’s Surface Transportation (FAST) Act (2015) program that provided funding to state and regional entities interested in researching and piloting VMT fees—with grant recipients in California, Delaware, Hawaii, Kansas, Minnesota, Missouri, New Hampshire, Ohio, Oregon, Texas, Utah, Washington, and Wyoming.³² Oregon was the first state to pilot a VMT fee in 2006, followed by Minnesota in 2011. Oregon continued to lead with the first enacted (but optional) program in 2015. See Figure 13.

FIGURE 13: STATE-LED VMT-FEE TIMELINE

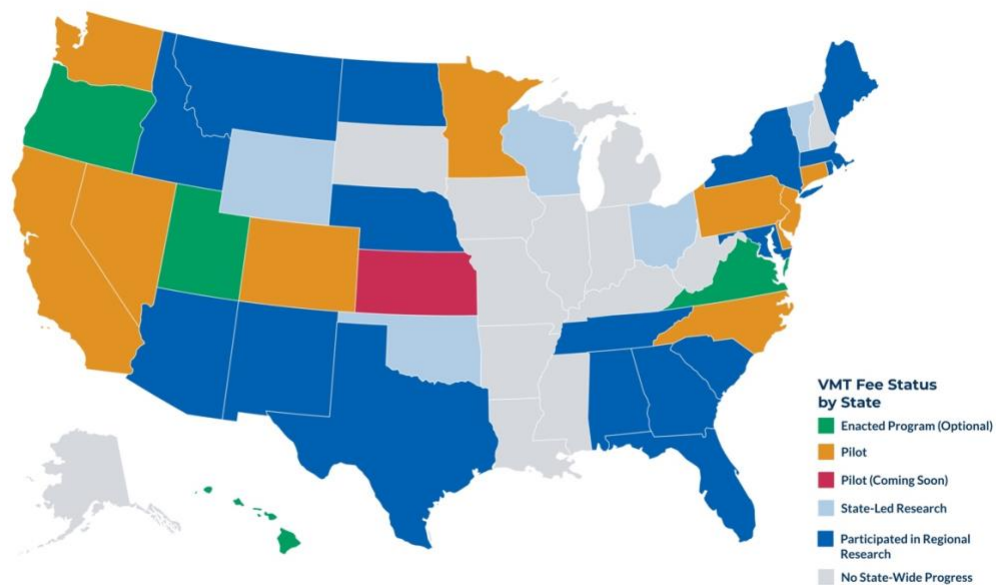


Note: See Appendix C for a list of state pilots

For the means of this research, a *pilot* is defined as a VMT-fee trial with a limited number of participants and a pre-determined end date. They typically serve as a proof of concept and simulate revenue collection in lieu of collecting revenue, with different iterations often focusing on collecting data from various focus groups or trialing different technologies and program structures. A *program* goes beyond the scope of a pilot and creates the long-term administrative and operating structure for a VMT fee that does not have an end date. Four states have enacted such programs: Oregon, Utah, Virginia, and Hawaii. None of these states have abandoned their gas taxes. Those that are using a VMT fee as an alternative to a fuel tax for its voluntary participants are so far only bringing in marginal additional revenue, if any, as they have to reimburse fuel taxes

paid. Virginia’s program is an alternative to a flat highway use fee paid by owners of fuel-efficient vehicles (25mpg or higher) and is the only program seeing significant revenue increases for transportation. Hawaii’s program was signed into law July 5, 2023; while too new to evaluate revenues, it also replaces an EV surcharge.³³ None of these programs are mandatory, but legislation has been introduced in the Oregon state house to make participation mandatory for passenger vehicles that have a gas-mileage greater than 30 mpg and are model year 2028 or later.³⁴ See Figure 14.

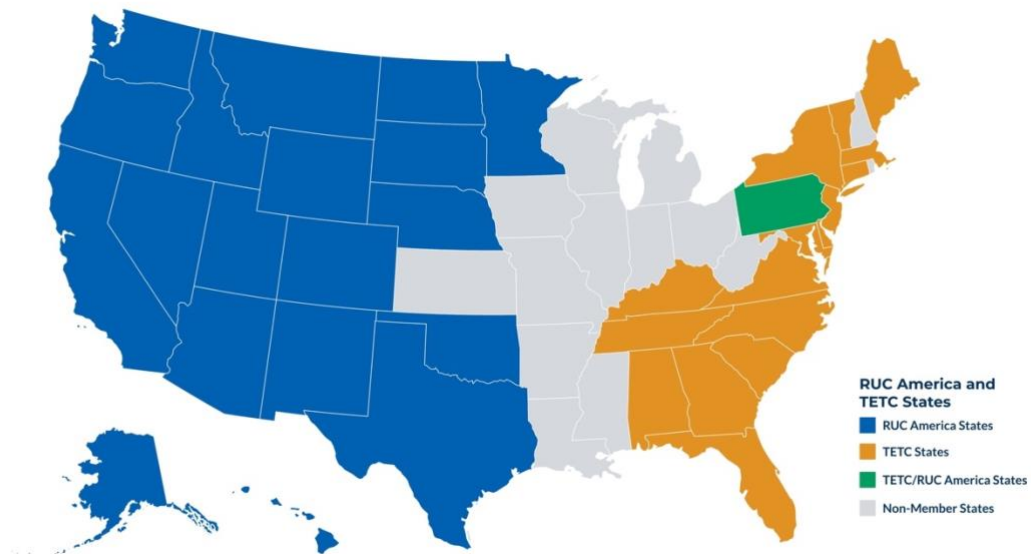
FIGURE 14: MAP OF STATE RESEARCH, PILOTS, AND PROGRAMS



Note: See Appendix C for a list of state pilots and programs

In addition to participation at the state Department of Transportation (DOT) level, two regional level research and piloting entities exist in the United States: RUC America³⁵ and the Eastern Transportation Coalition (TETC).³⁶ Both serve as coordinating agencies for a group of states and are uniquely positioned to explore interoperability concerns. Although their membership is growing, RUC America serves mostly western states, and TETC mostly serves states located along the Interstate-95 Corridor on the east coast. See Figure 15. While there are similarities, pilots around the United States vary widely in their design, data exploration, and outcomes. This section explores the various administration structures, interoperability concerns, data collection technologies, and privacy and equity considerations, for both commercial and passenger vehicle pilots.

FIGURE 15: MAP OF RUC AMERICA AND EASTERN TRANSPORTATION COALITION MEMBER STATES



4.1 Administration

The various state VMT-fee pilots deploy a range of administrative schemes. While almost all involve their departments of transportation—Virginia’s program is the exception as it is housed under its Department of Motor Vehicles (DMV)—some include other state-level departments and stakeholders. For example, Utah’s program is operated out of their DOT, but their DMV shares data to support essential program functions, such as determination of vehicle type. Minnesota had included their department of revenue in its most recent iteration because they manage their existing fuel tax collection. For almost all of the state pilots and programs, the management of participant accounts is outsourced to a private-sector commercial account manager (CAM), such as Azuga or Emovis. Oregon offers in-house account management to its participants alongside both Azuga and Emovis and is the only program that currently does so.

New Zealand

A RUC has been implemented in New Zealand since 1977.³⁷ The program only includes vehicles (both passenger and commercial) that use diesel fuel, and any vehicle with a manufacturer’s gross laden weight of 3.5 tonnes or more. Vehicles that use gasoline compressed natural gas, or liquified petroleum gas, are not included because they pay for their road use through fuel taxes. EVs are exempt from the program and do not pay a road user charge.³⁸

The RUC is administered through a pre-pay system with the purchase of distance licenses, each license allowing for 1000km of travel.

State leaders saw this outsourcing as successful, because they could leverage technologies and workforce that already existed, remove themselves from data privacy concerns, and provide their participants with value added services that CAMs can offer, such as trip history and fuel usage.

For commercial vehicle pilots, the administrative structure has looked similar. TETC's Multi-state Truck Pilot (2018-19) and their National Truck Pilot ((2021-21) partnered with EROAD, a transportation technology solutions company based in New Zealand, to leverage the data already collected for their customers through their on-board units.³⁹ TETC's partnership with a CAM allowed for the offloading of data collection and data protection to a commercial entity with experience and expertise.

For the federal pilot, IIJA prescribes some of the administrative structure. IIJA stipulates that the U.S. Treasury Department should collect revenue as a part of the pilot, but where the program should be housed at USDOT is not prescribed. Additionally, since the federal government does not have a department of motor vehicles or a national vehicle registration system, the administration of a federal pilot will likely need to look different from that of the state pilots.

The administrative structure of a national pilot will also need to consider how to interface a federal program with an existing state program in an interoperable manner. As of July 2023, there has been no instance where a vehicle owner has been able to participate in two VMT-fee pilots or programs that have been administered by two separate entities.

4.2 Interoperability

European Countries

Nine European Union (EU) countries have deployed RUC programs, including Austria, Czechia, Germany, and Switzerland, with an additional 11 evaluating a possible scheme. These programs are primarily aimed at "heavy goods vehicles" (HGVs), and use on-board devices to administer the RUC.⁴⁰

The EU has established a framework to encourage member states to "use taxation and infrastructure charging in the most effective and fair manner in order to promote the 'user pays' and 'polluter pays' principles, as enshrined in the treaties."⁴¹ Germany attempted to implement a road user charge for passenger vehicles on its federal roadways, but it was rejected by the European Court of Justice as it would have penalized non-residents by charging them more.⁴² Norway piloted a RUC for passenger vehicles, but it has not yet been implemented.⁴³

In addition to administrative interoperability between the federal and state pilots, cooperation is needed between states to properly charge vehicle owners who traverse state lines. In its simplest form, federal fuel tax replacement only requires an odometer reading and can be location agnostic. However, more is needed to accurately administer a state-level VMT fee, especially for states that experience large amounts of interstate travel. The federal government will likely need to consider and regulate these interstate transactions of data and funds. In some programs, pilot participants who drove out of state could apply for a refund for those miles driven. This manual process will become overly burdensome when VMT-fee program participation is made mandatory. Oregon and California have explored what complimentary programs could look like through an interoperability study as part of the OReGO program and California RUC pilot; a cloud-based clearinghouse was used to reconcile funds across state lines.⁴⁴ However, it is important to note that this reconciliation requires a GPS[§] reporting method, which many pilots found some of their participants felt uneasy toward due to privacy concerns.

The current fuel tax agreement with heavy vehicles may provide a model for interoperability when driving across state lines. The International Fuel Tax Agreement (IFTA) was created in 1991 with the passage of the Intermodal Surface

Transportation Efficiency Act (ISTEA). Before IFTA, each state had its own fuel tax system for heavy vehicles and a truck needed to buy permits for each state that it drove through. IFTA simplified this system by allowing truck operators to file and pay in their home state, and then the money would be redistributed based on where fuel had been purchased and miles had been driven.

[§] Global Positioning System

The International Registration Plan (IRP) also simplified the commercial vehicles registration process.⁴⁵ While there are aspects of this system that would become more complicated with the introduction of private vehicles, IFTA and IRP's coordination structures and redistributions can act as a model for state-to-state interoperability.

4.3 Technology

There is no clear consensus on a particular data collection method of choice among the state pilots. Most offer more than one data reporting option, with some offering as many as five reporting options. These reporting options include:

- **Manual odometer reading** – An odometer reading is reported either in person (usually through a vehicle inspection) or through submission of an odometer photo online.
- **Smartphone reporting via mobile app (no GPS)** – A smartphone app is used to report mileage without location information, most commonly through odometer photo submission.
- **Smartphone reporting via mobile app (GPS-enabled)** – A smartphone app is used to report mileage using location information through GPS technology on the smartphone.
- **OBD-II plug-in-device (no GPS)** – A plug in device that is on-board diagnostic II port compatible is used to report miles traveled (amongst other data like fuel consumption), without GPS data.
- **OBD-II plug-in-device (GPS-enabled)** - A plug in device that is on-board diagnostic II port compatible is used to report miles traveled (amongst other data like fuel consumption), and more specifically where those miles are travelled, using GPS technology.
- **In-vehicle telematics** – Already existing integrated data technology in vehicle systems is leveraged to report miles traveled, with the capability to report where those miles were travelled.



OBD-II plug-in device

Table 2 shows the data collection technologies that have been deployed in each state-coordinated, passenger vehicle pilot or program.

TABLE 2: DATA COLLECTION TECHNOLOGIES OF STATE-LEVEL PASSENGER VEHICLE PILOTS

	In-Vehicle Telematics	OBD-II (GPS)	OBD-II (no GPS)	Mobile App (GPS)	Mobile App (No GPS)	Manual
Oregon*						
Minnesota*						
Colorado						
Washington						
California*						
Utah						
Hawaii						
Virginia						
Nevada						
Delaware ⁺						
Pennsylvania ⁺						

⁺ State pilots administered by TETC in coordination with their state departments of transportation.

* States with multiple pilot/program iterations

Note: not all reporting options may have been available simultaneously, but available in different pilot iterations in each state. Table 3 does not include states with ongoing or concluded pilots that do not yet have a published final report as of July 2023.

For commercial vehicles, pilots have used on-board fleet management devices to administer a VMT fee. This approach is beneficial because it leverages existing technology and reporting systems instead of adding another technology or administrative layer to the trucking industry.

The various reporting methods have benefits and drawbacks. Manual reporting is usually cheaper as it does not require expensive technology or back-office data collection systems, but it requires more intentionality from the participant to periodically upload or report their odometer reading in-person. Additionally, its lack of GPS capability makes interoperability more difficult as it does not account for where the miles are driven. Smartphone reporting allows for GPS tracking but is not accessible for participants who do not already own a smartphone device. If more than one person drives the same vehicle, the registered smartphone must be in the vehicle no matter who is driving. OBD-II device tracking is low maintenance once a participant installs the device, but the initial install can be challenging for drivers, as many struggle to locate their OBD-II port. Physical devices are also the most expensive technology and will likely require replacement and upgrades throughout a program.⁴⁶

While there is some skepticism as to how effectively they can be leveraged, in-vehicle telematics are seen by many as an ultimate VMT-fee goal. In-vehicle telematics are the data that a vehicle generates and can be stored and sent to and from vehicles using a wireless network.⁴⁷ Historically, this data has been routed through the original equipment manufacturer (OEM), which acts as a gatekeeper for that data. State pilot programs have had varying levels of success working with OEMs to access this data. The general sense from stakeholders involved in state pilots is that OEMs are concerned their product to be responsible for what a vehicle owner may see as added cost and unnecessary capture of their data. There are, however, private companies (ex: Smartcar) that provide an application programming interface (API) that help developers connect to vehicle telematics by allowing more open access.⁴⁸ Since 9 in 10 new cars in the United States was connected to the internet in 2020, telematics becomes an increasingly attractive option for vehicle data collection.⁴⁹ However at present, telematics are not substantially cheaper than using devices to collect a VMT fee.⁵⁰

IIJA prescribes that more than one reporting option is to be offered in the federal pilot. State pilots indicate that providing this choice is an important part of VMT-fee acceptance, as many of their participants were not comfortable with a GPS reporting option, no matter how their data was protected. Understanding the administrative cost variances for each reporting method will be an important part of determining long-term feasibility of VMT fees as a revenue replacement tool.

4.4 Privacy

Protecting the data that comes from a VMT-fee pilot is essential. Many state pilots cede their data to a CAM, often because their surveys indicate that participants are more trusting of their data to a private entity than to the government. The options mentioned above provide varying levels of privacy; non-GPS options can eliminate concerns of tracking, but still allow collection of data that can be used to implement a VMT fee. Manual reporting methods can reduce concerns about the scope of the data being collected. For some, these methods will still not be acceptable, so an opt out fee is often proposed.

To further combat these concerns, many pilots have used a targeted education and outreach approach to help inform drivers in their states of the merits of the program, the need for replacement of fuel tax revenue, and to dispel myths about VMT fees.

4.5 Equity

As with any successful program, equity considerations are at the forefront of the conversation. Notably, pilot programs are interested in how a switch to road usage charging affects the amount that subsectors of vehicle owners pay compared to what they pay under current fuel tax structures. For example, states reported that their residents had concerns that rural drivers would pay more with a VMT fee. Many states, including Utah and Oregon, found that this not to be the case. Because rural vehicles can be larger and less fuel efficient, a VMT fee would decrease the amount they pay in user fees per mile in most cases.⁵¹ While they still may pay more than an urban driver because they drive longer distances, the VMT fee would make user fees more fairly match with the amount of wear and tear a vehicle inflicts, meaning each driver pays closer to their fair share.

Another consideration is how these fees could impact low-income drivers. Under a VMT-fee system, some drivers would pay more than what they used to pay in fuel taxes. While this creates fairness in terms of paying for what you use, an increase in vehicular operation cost could have a greater relative impact on a low-income driver.

5.0 Outlining Goals for the National VMT-Fee Pilot

To better inform the national VMT-fee pilot, Eno worked with a diverse set of stakeholders and developed a set of goals or 'ideal outcomes' for the program. We conducted four expert workshops covering topics including trucking and commercial vehicles, interoperability, data and metrics, recruitment, public relations, enforcement and compliance. We also interviewed industry experts and consulted with our advisory panel. These goals outline objectives that the national pilot should consider to test the design, acceptance, implementation, and financial sustainability of a national system.

Given the significant complexities inherent in establishing a national VMT-fee pilot, it will be difficult to answer all the outstanding questions that stand to inform a potential implementation. This is especially true given the relatively limited research funds appropriated to the national pilot (\$50 million over five years). Therefore, Eno prioritized a set of goals into primary and secondary categories. The primary goals are those that must be evaluated at the national level in order to make an informed decision on implementing a national VMT fee. The secondary goals are important and still need to be explored, but their objectives are not essential to informing that decision.

5.1 Primary Goals

Determine which data elements are needed to administer a national VMT-fee program, with the goal of constructing the simplest implementation possible.

Although a VMT-fee pilot can accomplish a range of objectives—including demand management and data collection for transportation planning purposes—the national pilot should focus solely on testing a VMT fee as an alternative or complement to the motor fuels tax to fund transportation. Any additional objectives might unnecessarily complicate the pilot, likely requiring more data and administration, bringing with it increased privacy and security concerns as well as increased cost. The national pilot needs to use the least amount of data required to administer a federal-level VMT-fee deployment.

Test scalability and, where possible, measure the impact on administrative practices and cost.

The IIJA stipulates that participants in the VMT-fee pilot must come from both the passenger and commercial sectors, all 50 states plus the District of Columbia and

Puerto Rico, and be an equitable geographic sample. These ambitious recruitment goals mean the national pilot will be the largest VMT-fee program undertaken in the United States, making it the best chance yet to test scalability; state-level pilots and programs have not been large enough to effectively measure if administrative costs decrease when scaled. The national pilot brings its own set of feasibility challenges. An understanding of those challenges on a larger scale will be necessary.

Explore and recommend the administration of cross-national border travel for both passenger and commercial vehicles.

While state and regional level VMT-fee pilots and programs explored cross-jurisdictional travel *within* the United States for over a decade, the national pilot will also need to consider cross-border travel with Canada and Mexico. Limited testing has occurred between Washington State and British Columbia and the national pilot should look to build on this expertise by exploring and ultimately recommending how to discount miles for U.S. drivers who incur miles out of the country and how to charge vehicles registered in other countries that drive on U.S. roadways.⁵²

Test administrative models, including state-to-federal, federal-to-state, and state-to-state remittance.

The challenge of interoperability is not new, and the national pilot will not need to consider VMT-fee collection between states. At the same time, states will continue their own experiments to explore replacing state-level motor fuels taxes. A federal-level pilot will have to interface with already existing (and future) VMT-fee pilots and programs.

It is impracticable for drivers to participate in both state-level and federal level pilots or programs. While vehicle owners could report at both the federal and state level using manual reporting methods, multiple GPS enabled smart-phone apps, or telematics data, doing so would be unwieldy. The simplicity of only having to register once would reduce overall costs and the administrative burden on the vehicle owner. Participation in more than one pilot with an OBD-II device for each would be impossible as passenger vehicles only have one OBD-II port. Historically, the trucking industry found having to register and report in multiple states created an unnecessary regulatory burden which resulted in the creation of IRP in 1973 and IFTA in 1983 (with compliance mandated by federal law in 1991). These regulations facilitated registration/reporting to a commercial vehicle's 'home state,' with fee redistribution through a centralized organization. There are two administrative models that should be explored to simplify VMT-fee administration:

- ***State-to-federal remittance*** – As many states already have VMT-fee pilots and programs underway, one model is for these pilots also collect and remit a fee for the federal government through their existing program, reducing duplicative structures.
- ***Federal-to-state remittance*** – Inversely, the federal government could collect both a federal fee and a state fee under a federal pilot, with the state fee being remitted to each state. This approach may not work for states that have existing pilots or programs but could be an attractive approach for states that have not yet advanced into the VMT-fee environment.

Examine potential elements of a standardized VMT-fee interoperability model for states that choose to impose VMT fees on out of state drivers.

Interoperability is key to a successful national VMT-fee pilot given the prevalence of interstate travel and the federal government should have a role in standardizing how states are managing interoperability issues. For example, the European Commission has set guidelines for its member countries as to how they should deploy a VMT-fee program if they choose to have one.⁵³ The National VMT-Fee Pilot should explore how a standardized interoperability model for states could look and aim to make recommendations as to standardized federal interoperability guidelines.

5.2 Secondary Goals

Test telematics access strategies and provide a recommendation for the best path forward to access this data.

In-vehicle telematics is considered an ideal data collection method given it requires no outside hardware installation and is expected to reduce administrative costs. However, pilots and programs in the United States have struggled to gain access to these data sources and stakeholders have indicated that OEMs are not readily willing to provide customer access to that data. VMT-fee schemes in the United States would benefit from the national pilot exploring telematics access strategies, including an attempt to foster partnerships with OEMs, use of telematics access companies like Smartcar (a car API platform for connected vehicles), and a potential mandate to allow customers to access their own data and consent to its use in a pilot.

Explore the Impact of a VMT Fee on un-banked individuals and recommend equitable payment approaches.

Existing state-level and regional pilots have not fully explored the impacts of a VMT fee on individuals who lack access to traditional payment methods like a credit or debit card. The national pilot should explore alternatives that do not require a bank account or a line of credit to ensure equitable access to road transportation.

Recommend a naming scheme for VMT fees in the United States.

Existing pilots and programs use a wide array of terms and branded monikers to describe their VMT fees, as described in Section 1. While not a primary objective, the national pilot should seek to determine a unified definition that can simplify future education and outreach processes.

6.0 Recommendations

The following recommendations outline strategies as to how USDOT should translate the legislation into a national pilot that will efficiently address the questions that need to be answered in order to make an informed decision when considering the future of transportation funding in the United States. These recommendations were developed through the input of the research advisory panel and consider the goals outlined in Section 5.

6.1 Federal System Funding Alternative Advisory Board

IIJA requires an advisory board to be formed within 90 days of passage of the law—a deadline that is long past—to assist with recommendations for the pilot, carrying out a public awareness campaign, and developing a report.

"Not later than 90 days after the date of enactment of this Act, the Secretary shall establish an advisory board, to be known as the 'Federal System Funding Alternative Advisory Board' to assist with... recommendations related to structure, scope, and methodology for developing and implementing the pilot program." – IIJA Section 13002(g)

Those recommendations are to be provided to the U.S. Secretary of Transportation one year after the establishment of the advisory board. The preceding section of IIJA also indicates that the advisory board should assist with a report to be submitted to both the Senate Committee on Environment and Public Works and the Committee on Transportation and Infrastructure of the House of Representatives that summarizes the results of pilot projects under the Strategic Innovation for Revenue Collection (SIRC) grant program, as well as provide recommendations that would enable potential implementation of a nationwide, user-based alternative revenue mechanism, if the pilots indicate their feasibility.

Strategic Innovation for Revenue Collection Grant Program

SIRC is an IIJA program that provides grant opportunities for states, metropolitan planning organizations, and local governments funds to implement pilot programs to test user-based alternative revenue mechanisms, provide recommendations regarding adoption of alternatives, to quantify administrative costs of alternatives, and other considerations.⁵⁴ SIRC is a continuation of the STSFA grant program from the Fast Act.⁵⁵

Although IIJA provides some detail as to the responsibilities of the Federal System Funding Alternative Advisory Board, its scope is not clear. As the name suggests, it may not simply be an advisory board for the national VMT-fee pilot but is intended to play a vital role in evaluating a whole gamut of sustainable transportation funding alternatives. With that in mind, the following recommendations will make the federal advisory board effective in achieving this mission:

Assemble the Federal Advisory Board as soon as possible.

Based on the HTF revenue projections detailed in Section 3, time is of the essence in finding alternatives. It is not a question of *when* the federal government will run out of time to find a solution, but *how long* they can successfully supplement our user-pay system with general fund revenues. Relying on general funds for transportation funding in a political climate that makes long-term spending commitments difficult creates too much uncertainty. USDOT should expeditiously request nominations for and assemble the federal advisory board to work with the many stakeholders who should be informing this exploration.

Consider the Federal Advisory Committee Act when structuring the activities of the advisory board.

The Federal Advisory Committee Act (FACA) of 1972, also known as the Sunshine Law, attempts to ensure citizen involvement in federal decisions is equitable and the no one

individual or group has undue influence. As outlined in a US Department of Agriculture-Forest Service FACA Key Principles and Practical Advice for Complying with FACA document, the government typically tries to avoid structuring an advisory group in a way that falls under FACA jurisdiction, unless that is their specific intent.

"A federal agency must comply with FACA when it (1) establishes, utilizes, controls, or manages, (2) a group with non-federal members that (3) provides the agency with consensus advice or recommendations" – USDA Forest Service⁵⁶

Congress was not clear in IIJA if their intent was to create a FACA group, but the parameters outlined likely make it subject to FACA requirements. Congress would have to make an exemption to avoid the need to consider the following:

How is the advisory board utilized? FACA regulation provides that an agency utilizes an advisory group when it exercises actual management or control over a group's operations.⁵⁷ While USDOT will likely meet this definition, they could consider giving the advisory group full independence in their operations, which would necessitate a chair elected from within the advisory board. This would include independence for the group to set its own agenda.

Is the goal of the advisory board to arrive at a consensus? The advisory board will be providing recommendations on the pilot and assembling a report both on the pilot and the outcomes of the SIRC grant program, which will likely invoke FACA. FACA requires that committee memberships be "fairly balanced in terms of the points of view represented and the functions to be performed."⁵⁸ As discussed in the following recommendations, this may create a cumbersome advisory board, and may require creative structures to enhance efficiency.

FACA requires that committee meetings must be scheduled at reasonably accessible and convenient times and locations, must be given adequate advance notice in the Federal Register, and must be open to the public, with exceptions for meetings including discussions of classified information, review of proprietary data, or deliberations involving considerations of personnel privacy.⁵⁹

Include a diverse range of voices and consider formats that would effectively leverage them.

VMT fees have the potential to impact a wide range of stakeholders and it is important that they are a part of this exploration. IIJA calls out the following groups that should be included in the advisory board:

- State Departments of Transportation
- Any public or nonprofit entity that led a surface transportation system funding alternatives (STSFA) pilot project
- The trucking industry, including owner-operator independent drivers
- Data security experts with expertise in personal privacy
- Academic experts in surface transportation systems
- Consumer advocates, including privacy experts
- Advocacy groups focused on equity
- Owners of motor vehicle fleets
- Owners and operators of toll facilities
- Tribal groups or representatives

In addition, the advisory board should include OEMs of both passenger and commercial vehicles. Since in-vehicle telematics continue to be considered as a potential lower-cost technology option for a VMT fee, bringing OEMs along early in the discussion could help address thorny data sharing concerns.

"The advisory board shall include, at a minimum, the following representatives and entities to be appointed by the Secretary" – IIJA Section 13002(g)(2)

It should also be considered, however, that the larger the advisory board, the longer it may take to launch, since it will likely require background checks and other administrative practices to finalize. The advisory board should be given the power to convene subcommittees or discussion groups—much like the expert workshops assembled for this research—in order to include the necessary perspectives in the right discussions.

Chose Advisory Board Chair from within its membership.

The chair of the federal advisory board should be selected from within its membership. This will be essential to maintaining an independent voice, as the advisory board is not a

subset of USDOT. If USDOT were to appoint a chair from within its staff, the advisory board could potentially lose the flexibility to explore the topics it feels necessary, making its work less beneficial and the pilot less informed.

In partnership with USDOT, develop the structure for the National Pilot.

While the Secretary of Transportation is responsible for establishing the pilot program, they are to do so in coordination with the Secretary of the Treasury and remain consistent with the recommendations of the advisory board. It may be possible for USDOT to shape the pilot on its own, giving the advisory board a more ceremonial role. However, the experience of the advisory board will be needed to help USDOT develop a feasible and useful national pilot. The advisory board should have an active role in identifying the needs for the national pilot, without overburdening it with explorations of elements already explored at the state level. The advisory board's input will be critical in making sure the national pilot provides sufficient information to USDOT and Congress so a decision can be made about the future of transportation funding. Additionally, USDOT should be cognizant of the fact that whichever term they use to describe charging drives by the mile will set a national precedent that will likely influence the terms used across the country for future pilots and programs at any level. Therefore, it should not be selected without leveraging the advisory panel's expertise through this partnership.

Recommend Further Research.

After the conclusion of the national pilot, the federal advisory board should use its expertise to recommend further research needed to holistically explore transportation revenue alternatives. These activities could include exploring funding sources besides a VMT fee, education and public acceptance campaigns, and the evaluation of the HTF model. Further research needs are explored in depth in Section 6.7.

6.2 National Pilot for Commercial Vehicles

From the various pilots in the United States that have included commercial vehicles, it is clear that trucks are not "big cars," and they require their own treatment under a VMT fee.⁶⁰

"In carrying out the pilot program, the Secretary, in coordination with the Secretary of Treasury, shall... include commercial vehicles and passenger motor vehicles"

A 2019 CBO report outlined options and potential obstacles for a VMT-fee pilot for commercial trucks.⁶¹ At a structural level, decisions must be made about the following three key elements:

1. **Tax base** – A national VMT fee on commercial vehicles could be on a subset of commercial vehicles, such as only combination semi-trailers, overweight vehicles, or only those using a specific fuel. The pilot should test all commercial vehicle types together, to understand any special considerations for those types.
2. **Implementation methods** – A national VMT fee on commercial vehicles could use a variety of collection technologies including manual odometer readings, onboard devices, or even toll-transponder-like devices. Both odometer readings (through IFTA reporting) and onboard devices are feasible for commercial vehicles. The national pilot could use both or either collection method, but should not be the focus of the pilot. Gantry-mounted Radio Frequency Identification (RFID) readers like those used by the tolling industry to read toll transponders like E-ZPass would be prohibitively expensive, both for a pilot and full implementation, and should not be tested.
3. **Rate structure** – A national VMT fee on commercial vehicles could be levied based on different rate-structure options. Based on TETC research, a fee based on miles per gallon is not feasible. The fee could instead be structured based on weight, vehicle class, or even a combination. Of these three elements, rate structure needs the most exploration.

Based on these considerations, the following recommendations should inform a national VMT-fee pilot for commercial vehicles:

Test various rate structures including a fee based on gross vehicle weight rating, gross registered weight, and vehicle class.



































There are many rate structures that could be considered for charging a commercial VMT fee. TETC considered trucking through three pilots, the first of which used a single rate that assumed an average fuel efficiency to rebate fuel taxes.⁶² This structure proved to be inequitable, as it rewarded fuel inefficient fleets with a rebate while it penalized fuel-efficient fleets. One flat rate, no matter its basis, would be inequitable due to the great variation in the commercial trucking industry.

TETC's second pilot used a tiered rate structure based on fuel-efficiency and found that they resulted in vastly different charges for trucks with similar MPGs, that created "winners and losers" and were difficult to explain to the participants.⁶³

TETC's International Truck Pilot (June-November 2022) used rates based on registered gross weight, a number easily accessible to the industry as it is located on the cab cards issued by the International Registration Plan (IRP) for every commercial vehicle over 26,000 lbs.⁶⁴ Registered gross weight is the maximum combined weight of both the vehicle and the load it is allowed to carry during the registration period. While the final report has not been released as of publication of this report, the coalition's Motor Carrier Working Group is optimistic about its success as a rate structure.

Going beyond rate structures that have already been tested in the United States, others should be considered. A rate structure based on Gross Vehicle Weight Rating (GVWR) would levy a fee based on the manufacturer's rating for the max combined weight allowable for the vehicle and trailer. The structure could also be based on the thirteen vehicle classifications set by the FHWA (Figure 16).

FIGURE 16: FHWA 13-CATEGORY VEHICLE CLASSIFICATION

Class 1 Motorcycles		Class 7 Four or more axle, single unit	
Class 2 Passenger cars		Class 8 Four or less axle, single trailer	
			
			
			
Class 3 Four tire, single unit		Class 9 5-Axle tractor semitrailer	
			
			
Class 4 Buses		Class 10 Six or more axle, single trailer	
		Class 11 Five or less axle, multi trailer	
			
Class 5 Two axle, six tire, single unit		Class 12 Six axle, multi-trailer	
			
		Class 13 Seven or more axle, multi-trailer	
Class 6 Three axle, single unit			
			
			

Source: Federal Highway Administration Office of Highway Policy Information⁶⁵

It should be considered, however, that the structure of the pilot may not need to prescribe a specific rate structure but could instead allow for the modularity to test rate structures and implementations with a select few fleet participants. In order to facilitate this modularity, the pilot should look to use existing structures and data, such as IFTA and IRP, so these structures can be easily plugged into the pilot to be tested.

Use rate structures that are simple and do not increase reporting burden for the trucking industry.

Regardless of what rate structures are piloted, simplicity for both the sake of the pilot and the sake of potential implementation will be key. Complicated rate structures that require increased reporting or weight measurements from the trucking industry will be impractical. While a rate structure based on the actual weight for each mile driven would most accurately charge for road usage as measured by road damage, the increased cost and burden would not be worth the small revenue increase you might see from this accuracy.

States and regional coalitions should continue to pilot a VMT fee for commercial vehicles.

A VMT fee for commercial vehicles has not been as widely tested as a VMT fee for passenger vehicles at the state and regional level. While the handful of pilots have begun to answer some of the questions, more exploration is needed to prove their efficacy. The national pilot is uniquely situated to answer questions of interoperability with a VMT fee for commercial vehicles, but states and regional pilots are able to test other elements. The national pilot should not bear all of this testing burden, and USDOT should take that into consideration when awarding SIRC grants.

6.2.1 Trucking rate setting considerations

Rate setting for the trucking portion of the pilot should be set with a few objectives in mind. Ideally, a VMT fee for commercial vehicles would replace all trucking excise taxes, and not just the diesel tax, so the fee should look to offset that revenue. This may not be feasible during a national pilot because remitting trucking excise taxes would be incredibly challenging. If the commercial vehicle VMT-fee pilot is collecting real revenue (as opposed to simulating it), it will likely need to take a fee setting approach that is diesel-tax revenue neutral. However, if the commercial vehicle pilot is simulating revenue collection, then the set fee becomes less important, but should be revenue neutral in respect to all fuel excise taxes, as an arbitrary rate could cause unnecessary alarm. Large adjustments will be harder to implement once a rate is piloted, due to perceptions of a tax increase, which further underscores the need for intentional rate setting for the pilot.

6.3 International Pilot

A pilot of vehicles that cross international borders could consider how to credit U.S.-registered drivers for miles driven in Canada and Mexico, as well as how to charge vehicles registered in another country for their road usage in the United States. Globally, international VMT fees are almost exclusively implemented for heavy vehicles. However, since the national pilot is considering implementations for both commercial vehicles and private passenger vehicles, international border testing would need to include all vehicle types.

Ultimately, international implementation should be piloted in a later phase.

Because of the nature of cross-border travel in the United States, an international pilot does not need to be prioritized. For passenger vehicles, a small subset of VMT by U.S.-registered vehicles are driven abroad. Even drivers who live near an international border and commute frequently across it (for example from Detroit, MI to Windsor, ON and from northern Washington state to Vancouver, British Columbia) are a small minority of overall VMT. Rebates for miles driven in non-registered jurisdictions are already being piloted at the state level and the lessons learned could easily be applied to a federal program to rebate miles driven internationally.

Capturing road usage by vehicles registered in other countries through user fees is much more important for commercial vehicles since they do more damage to U.S. roadways (especially federally funded roadways) than passenger vehicles.⁶⁶ Internationally registered trucks already pay user fees through IFTA and IRP. If commercial vehicles were expected to transition to alternative fuels as quickly as passenger vehicles, capturing their revenue through a VMT fee as quickly as possible would be required to prevent sharply diminishing revenues. However, the fleet transition of commercial vehicles is currently de minimis, with all types of electrified trucks (including hybrids) comprising less than 0.1 percent of new medium and heavy truck sales in 2022, which the Energy Department projects to rise to just 0.4 percent of new sales by 2030 and 0.6 percent of new sales by 2040; future projections continue to show a slow transition.⁶⁷ Consequently, finding a funding alternative is less urgent due to the greater projected success-rate of the diesel tax. Therefore, while it is still an important consideration, USDOT and the advisory board can feel comfortable prioritizing other initiatives in the beginning phases of the national pilot.

6.3.1 State testing considerations

It is possible for states to test international implementations of a VMT fee—Washington State has already attempted to do so for passenger vehicles registered in Washington who drive across the Canadian border.⁶⁸ However, doing so for both U.S.-registered and internationally-registered vehicles would be incredibly difficult for a few reasons:

Federal border crossing infrastructure: States would not be able to leverage federal border crossing infrastructure on their own. Although not necessary for administering rebates to U.S.-registered vehicles for miles traveled abroad, federal border crossing infrastructure would likely be needed to impose a VMT fee on passenger vehicles entering the United States with foreign registrations, unless reciprocity agreements were coordinated between the U.S. and the vehicle's registered country (much like IFTA and IRP already administer between the U.S. and most Canadian provinces for heavy commercial vehicles).

Revenue collection and enrollment: The elements that most need testing are the implementations for non-U.S.-registered vehicles. Recruiting non-American participants and potentially imposing a fee on them for their miles driven in the United States is an uncertain area that would need federal involvement as states would not likely be willing or able to explore this on their own.

6.4 National Pilot for Private Passenger Vehicles

The largest unknown for a national VMT fee is implementation on all private passenger vehicles. While other countries have addressed many of the implementation concerns in their programs that administer international commercial-vehicle VMT fees, as of July 2023 there are no widespread programs that impose a fee on all passenger vehicles.

Fortunately, state and regional level pilots in the United States have been examining VMT-fee implementations for over a decade and provided many of the answers needed to determine their feasibility. However, questions remain and implementing a program at the federal level presents its own set of challenges. The following need to be considered when developing a national VMT-fee pilot for passenger vehicles:

Only test what absolutely needs to be tested at the federal level.

The development of this pilot continues to be slow and there has been no external indication that USDOT is making progress on preparing for the pilot. Additionally, the resources for the national pilot are limited. Unnecessarily testing VMT-fee

implementations on a national scale that could be tested at the state or regional level will be less constructive than testing at other levels that continue to receive funding and already have momentum.

The pilot should be phased, both geographically and sequentially.

As with many of the state and regional pilots, the national pilot should use phasing to use the funds and time available more effectively. In other words, certain VMT-fee implementations can be tested in different regions by USDOT and they do not all have to take place at the same time or for the same amount of time.

Test minimum data required to administer a national VMT fee, scalability, and administrative models.

As has been seen at the state and regional level, privacy concerns will remain a concern as a national pilot is administered. Collecting more data than necessary to administer a national VMT fee creates greater risk for participants and the government and will harm potential acceptance. Additionally, existing pilots have not been large enough to provide insights into how administrative costs and burdens change as programs are scaled up. Since the national pilot requires participation in all 50 states, DC, and Puerto Rico, the size of the pilot will provide the first real opportunity in the United States to attempt to do so. Finally, at the national level, federalism provides unique challenges in terms of interoperability of multiple programs for participants who may want to (or eventually be required to) participate in both a state and federal VMT fee. The logistics of how this might work need to be ironed out in the national pilot.

6.4.1 Pilot Concept

Even the most astute reader may be finding it hard to visualize what the national pilot could look like for passenger vehicles. The research team developed the following model based on the above considerations to help illustrate these ideas.

The concept uses three passenger-vehicle implementation designs on three separate cohorts of volunteers within the national pilot for private passenger vehicles. This will allow larger-scale testing with a bigger cohort of volunteers, but also allows for the testing of more complex, more expensive, and likely more data-intensive implementations with smaller cohorts. While the cohorts are proposed as three separate groups, elements of the pilot could be applied to all groups when it makes sense (i.e. surveys). Multiple cohorts also allow for the testing of different administrative models,

including how it might look for a state to administer both a state and federal VMT fee and remit the fee to the federal government, and vice-versa.

Cohort A:

Cohort A would be the biggest implementation and would recruit as many participants as feasibly possible to provide insights into the scalability of a VMT-fee program. This cohort could consist of participants from any of the 52 jurisdictions, regardless of whether programs or pilots exist at other levels. For simplicity of administration, the participants would need to not be involved in another existing program. Additionally, this implementation would require the least amount of data collection and could be location agnostic in order to provide the opportunity to test the accuracy of fuel tax remittance using a participant's vehicle identification number (VIN). As outlined in IIJA, this implementation could collect actual revenue and deposit it into the HTF.

Cohort B:

Cohort B would be a smaller implementation and would recruit participants in states that already have a pilot or program but are not necessarily participating in them. The states and regional programs would administer a federal VMT fee under their current systems and rebate federal fuel tax for its participants. This could happen on top of their state VMT-fee collection and fuel tax rebate. Cohort B would likely experience more data exposure than cohort A, as existing programs at state and regional levels collect location data from the majority of their participants. This implementation could collect or simulate revenue, based on what the state program is already (or is interested in) doing. For simplicity and cost minimization, the pilot could choose specific states to partner with and solicit participants for this cohort from those places as opposed to any jurisdiction that has an existing program.

Cohort C:

Cohort C would also be a smaller implementation and would recruit participants in states that do not have a pilot or program but are cooperative and open to VMT fees. USDOT would administer the pilot but would collect both a federal and a state VMT fee, working with the jurisdiction to rebate both federal and state fuel taxes, and remitting the state fee to the state government. Cohort C would also have more data exposure than cohort A, as location data would likely be needed to determine which miles were driven in the state jurisdiction. Like Cohort B, the pilot could choose specific places to partner with, though there is some debate as to whether the federal government has the authority to administer a fee on behalf of the state, so the legal concerns would need to be addressed.

6.4.2 Rate Structures for Passenger Vehicles

The basis of a rate structure for passenger vehicles can be simple (e.g., one flat fee per mile driven, no matter the passenger vehicle) or it can be made much more complex. The national pilot affords the opportunity to evaluate the feasibility and value of more complex rate structures. For instance, a rate based on fuel efficiency could potentially incentivize the purchase of fuel-efficient vehicles and reduced VMT for less-efficient vehicles, but the equity impacts on drivers need to be better understood, as older, less efficient vehicles tend to be owned by those with lower incomes. More complex rate structures also require more information from vehicles owners. It is proposed that a participant's VIN could be collected at registration to identify a vehicle's fuel efficiency, but there is concern that subtle inconsistencies would make these assumptions inaccurate for some vehicle owners. Another structure could charge different rates based on the type of passenger vehicle (sedan, SUV, truck, etc). Doing so could disincentivize the purchase of larger vehicles but details on classifications would need to be clarified.

More complex rate structures, however, meander away from the main goal of a national pilot: to find a sustainable alternative transportation revenue source. While they would create revenue, they also aim to accomplish other policy goals. Regardless of the merits of those policy goals, their addition to this pilot will likely decrease its political viability. Ultimately, more complex rate structures for passenger vehicles should only be tested on a small scale at the national level, but preferably at the state or regional level. This effort could be supported through the SIRC grant program and should be taken into consideration by USDOT when awarding those grants.

6.4.3 Considerations for Recruitment

Recruitment for a national VMT-fee pilot will look different than at the state and regional level and will likely be more difficult. For many existing programs, participants are incentivized to opt-in by the prospect that they might pay less for their road usage under a VMT-fee scheme than a motor fuel tax. Other road fees for the participant, such as an annual EV registration surcharge or an annual highway use fee, as implemented in Virginia, are waived if participating. At the national level, no such fees exist, and they are not likely to exist, as vehicle owners do not register their vehicle with the federal government. The national pilot could offer monetary incentives, including gift cards and tax rebates, to incentivize participation, as is common among the state pilots. Participants may also join, simply out of interest in the program. Even those who are strongly opposed to VMT fees might volunteer to participate to try to "break the system."

6.4.4 Additional Recommendations

Do not promote, or recommend against, more complex systems.

One of the potential benefits of a VMT fee and its associated technology is that it can be used for a variety of different means: the technology can allow for congestion pricing and low emissions zones, and the data can provide valuable information to transportation planners. While these more complex implementations should be explored in the future, doing so now would be counterproductive to the efforts of the pilot. Since the overarching goal is to establish a new revenue stream to bring solvency to the HTF, add-ons to the national pilot could politically harm the option before it is even fairly considered. USDOT should, however, remain open to states testing some of these more complex implementations alongside the national pilot, but they should not be supported by the funds and workforce provided by USDOT to the national pilot.

USDOT should consider using Commercial Account Managers (CAMs) to manage the data, payment, and technology needs of the pilot, where applicable.

As is standard practice with almost all the state and regional pilots, USDOT should consider soliciting bids from CAMs to manage parts of the national pilot, especially the more data intensive implementations. CAMs provide many benefits, including their existing expertise from existing programs and value-added services they can provide to participants. A CAM model allows governments to point to data safeguards that often do not even allow participants to be identifiable by the government. While using a CAM to administer a location-agnostic federal RUC based on a manual odometer reading might not make as much sense, a CAM can assuage many of the privacy concerns for implementations that use location data.

6.5 Exploration at the State and Regional Level

As mentioned, there are many VMT-fee elements that could be piloted at the state and regional levels before they are piloted nationwide. The following testing needs should be taken into consideration by state and regional entities that are eligible to apply for SIRC grants in their applications and by USDOT when awarding those grants.

6.5.1 Trucking Rate Structures

States or regional coalitions should test various rate structures based on different weight definitions and vehicle classifications to understand the benefits and trade-offs

associated with a simple rate structure with a few stratifications or a more complex rate structure with many stratifications. Once these smaller pilots identify a rate structure that is most equitable and cost-effective, then USDOT can focus on piloting that one rate structure nationally, while testing other rates with much smaller groups if the advisory board feels more study is required.

6.5.2 International Border Crossings

States or regional coalitions should attempt to pilot international border crossings for both passenger and commercial vehicles. While this may require some federal coordination—without it, states would likely not be able to leverage the federal border crossing infrastructure that may be needed for certain implementation models, especially those that are location agnostic—there is potential for states to rebate for miles driven in Canada or Mexico, especially for those who already participate in a pilot that uses GPS enabled collection methods (much like they already can rebate for miles driven in another state). For commercial vehicles specifically, TETC has already piloted internationally through partnerships with existing systems at IRP and IFTA.

6.5.3 Equity Impacts on Un-Banked Individuals

States or regional coalitions should consider the equity impacts on un-banked individuals. Most existing pilots have only used payment options that require a bank account or credit card for payment, and almost all have required payment after miles are driven, which is a departure of the pre-payment one might experience with the current fuel tax. Understanding how to better accommodate for unbanked individuals, who typically are of lower incomes, and the impacts that billing structures can have will be essential to constructing a successful implementation that would work for all road users. However, this does not need to be tested at the federal level, as these impacts would not vary significantly from those at the state and regional levels.

6.5.4 Telematics Access Strategies

States or regional coalitions should consider strategies for leveraging in-vehicle telematics data, which have proven hard to access. They should work with OEMs to offer their customers access to telematics as a reporting option. If OEMs are unwilling to allow their customers access to the data that their driving habits generate, other strategies may be considered including legislative options that clearly designate the vehicle owner as the owner of their data, or even a mandate for OEMs to allow their customers access to their data.

6.6 A Federal VMT-Fee Interoperability Model

One of the hopes for a national VMT-fee pilot is to provide leadership for state-to-state interoperability. While there has been some limited testing between pilots in different states, it is less clear how this interoperability may work for drivers who drive through a state with a VMT-fee program but are not registered for a program in their home state. Do they register with the state that they are driving through? Do they have to do this for all the states that they drive through? Much can be learned from the expertise of the trucking and tolling industries, who over time have gone from a fragmented system of vehicle registrations or electronic tolling transponders, to one (or a few) systems that do not require participation in a program in each jurisdiction they drive through. The federal government will need to regulate the interstate transaction of data and funds.

The Federal Advisory Board should convene an Interoperability Working Group to consider elements of a Federal VMT-Fee Interoperability Model.

The advisory board should convene leaders in the VMT-fee space from existing pilots and programs, as well as interoperability experts from the trucking and tolling industries to consider the following elements for a federal interoperability model. This interoperability model should not only consider drivers whose vehicle-registration state is a VMT-fee adopter, but also those whose vehicle-registration state is not, meaning they are not already enrolled in a program that could work to remit the fees charged for their miles. In the EU, member countries do not have to impose a VMT fee on internationally-registered vehicles (right now these implementations are for commercial vehicles only), but if they do, they have to adhere to a set of best practices.⁶⁹ An interoperability model in the United States could work in a similar manner.

Data Standards: From both a privacy and interoperability perspective, data standards will be an important part of a successful implementation of VMT fees across all levels of government. Data standards should be considered that preserve the privacy of participants, even as data changes hands in interoperable implementations. These data standards should consider what data is necessary to administer an interoperable VMT fee, transmit that data, and nothing more. Participants should be able to clearly understand who has access to what elements of the data they are creating and what elements are being shared with entities beyond that administering the program they are registered with. Data standards should also create uniformity in data formats so that entities can easily transmit data through a clearing house without the confusion of varying data treatments. The working group should consider their existing data formats,

the benefits and drawbacks of each, and propose one unified format that can be used nationally.

6.7 Recommendations for Further Research and Activity

Throughout this research, it has been evident that more than a national VMT-fee pilot will be needed to consider sustainable transportation funding alternatives at the federal level. It is not certain that a national VMT fee will be the best or only solution for transportation funding: the necessity of a national pilot before implementing a program is proof of that. Likely, the solution will be a patchwork of revenue collection innovations, which may include VMT fees. After the conclusion of the national pilot, the advisory board should consider the following research and outreach and make recommendations to USDOT and to Congress about which research foci need to be explored and funded.

Explore funding models besides a VMT fee.

The success of a VMT fee for all road users is still unknown, as no jurisdiction in the world has attempted to implement a per-mile fee for all road users. Existing pilots and implementations in the United States remain more expensive than the fuel tax, and many are losing money (or would be, if they are only simulating revenue collection) as the net revenue after collection costs is less than the fuel tax they would have brought in otherwise. Politically, implementation will face significant opposition, because in order to be successful, drivers will have to pay more per year than they are currently paying through the fuel tax or EV fees to replace fuel tax revenue, and even more beyond that to sustain the HTF long term. Keeping that in mind, the following funding models should also be researched as alternatives or complements to a VMT fee:

Annual Registration Fees: While already being implemented for electric vehicles in at least 32 states, there may be potential to apply additional fees to all vehicles.⁷⁰ There is concern that such fees are a deterrent for EV adoption, or that they do not make a lot of sense because it is only reclaiming some of the federal and state rebates for EV purchases. Applying a fee to all vehicles would alleviate this concern and would address the largest source of revenue declines: hybrid and fuel-efficient vehicles. Virginia has already implemented an annual fee through its ‘highway use fee’ (HUF), which drivers can opt into a VMT-fee structure if they think they will drive below the mile threshold the fee is based upon, giving them the opportunity to pay less. At the federal level, this would be logistically challenging because the United States does not have national vehicle registration requirements, and more research is needed to understand the feasibility of this option.

Kilowatt-hour Fees:

Fees on the electricity used to charge EVs—known as kilowatt-hour (KWh) fees—are another proposed alternative but are not as proven as other options. In theory, KWh fees are an attractive choice: they use the same user model as the motor fuels tax. But in practice, they have not been implemented successfully. A major problem is that 80 percent of EV charging happens at home, and not at public charging stations.⁷⁶ Without mandates for the installation of separate meters at homes for EV charging, a KWh fee would only capture a small part of EV charging and would disproportionately collect fees from lower income vehicle owners who are less likely to have an at-home charger. KWh fees may make more sense on DC fast chargers along highway corridors; these chargers are often used by long-distance travelers and would be a way of collecting revenue from tourists who are benefitting from long distance highway infrastructure. Regardless of the implementation, KWh fees fail to address the largest driver of reduced revenue—fuel efficiency improvements of internal combustion engines—and cannot be the only solution, at least in the near/medium term.

Pennsylvania Alternative Fuels Tax

A tax on alternative motor fuels including electricity, hydrogen, compressed natural gas, and propane has existed in varying capacity since 2005.⁷¹ Recently introduced legislation aims to replace the tax on at-home charging for EV owners and instead charge a \$290 annual fee at registration.⁷² The current tax on EV charging proved unenforceable, as it requires EV owners to file a monthly report of electricity consumed through vehicle charging.⁷³

Iowa Electric Fuel Excise Tax

In 2019, Iowa instituted a tax on electric fuel in addition to an annual EV registration fee.⁷⁴ However, implementation was delayed, as many of the chargers in use in the state in 2019 did not have the technological capability to measure the electricity used for each charge.⁷⁵ The fee became active on July 1, 2023, but does not apply to at-home charging.

Conduct a targeted education campaign, focusing on the problem, not the solution.

An education and outreach campaign will be a critical part of the exploration and recommendation of fuel tax replacements. IIJA gives the federal advisory board the opportunity to carry out a public awareness campaign regarding a national motor vehicle per-mile user fee, including distribution of information related to the pilot program, the STSFA programs, and consumer privacy. The advisory board should work with USDOT to go *beyond* what is proposed in IIJA and more generally provide education about the transportation funding crisis in the United States. Any education

about VMT fees specifically should serve the pilot itself—educating potential participants in order to recruit them—and not to advocate for VMT fees as the final solution to the transportation funding crisis. This would be premature as it is not clear if VMT fees will be implementable at the federal level. The limited pilot resources would be better spent other ways.

7.0 Conclusion

Ultimately, the national VMT-fee pilot program will only be useful if it provides the ability to fully understand the benefits of the user-pay model and to weigh the potential of using a different funding structure entirely. But while Congress demonstrated its commitment to exploring a new system by including the pilot in the infrastructure law, the authorized funding and timeframe means there is also a need to manage expectations. The national pilot will not be able to comprehensively address all the complexities and answer all the questions pertaining to how such a program is launched. Plus, although the law directed the USDOT to establish the Federal System Funding Alternative Advisory Board by March 2022, it has not yet done so.

Fortunately, the USDOT will not have to start with a blank slate. The interest in VMT fees has grown and now includes research and pilot programs in 36 states, with many of these pilot programs began or expanded with grant funding from the federal government. The USDOT should make sure to learn from these experiments and to lean on the experts and stakeholders for their advice and perspectives.

In doing so, the national pilot can focus its energy and attention on those elements of a VMT fee that must be addressed by the federal government. Interoperability, standardization, and international border crossings all fall within the purview of USDOT and concentrating on discrete elements can build off the state work and provide important advice and recommendations to Congress. Advancement of a national VMT-fee system will require adequate system development, promotion of national awareness and improvement of public opinion, combining state and federal efforts into a unified national concept, demonstration of national leadership, and resolution of the key issues learned from the initial pilot programs. Determining whether or not motor vehicle per-mile user fees are the most viable and sustainable long-term user pay option for the transportation program, as well as the national commission asserted in 2009, should be the goal.

Appendix A: IJA Section 13002 – National Motor Vehicle Per-Mile User Fee Pilot

SEC. 13002. NATIONAL MOTOR VEHICLE PER-MILE USER FEE PILOT.⁷⁷

(a) Definitions.--In this section:

(1) Advisory board.--The term "advisory board" means the Federal System Funding Alternative Advisory Board established under subsection (g)(1).

(2) Commercial vehicle.--The term "commercial vehicle" has the meaning given the term commercial motor vehicle in section 31101 of title 49, United States Code.

(3) Highway trust fund.--The term "Highway Trust Fund" means the Highway Trust Fund established under section 9503 of the Internal Revenue Code of 1986.

(4) Light truck.--The term "light truck" has the meaning given the term in section 523.2 of title 49, Code of Federal Regulations (or successor regulations).

(5) Medium- and heavy-duty truck.--The term "medium- and heavy-duty truck" has the meaning given the term "commercial medium- and heavy-duty on-highway vehicle" in section 32901(a) title 49, United States Code.

(6) Passenger motor vehicle.--The term "passenger motor vehicle" has the meaning given the term in section 32101 of title 49, United States Code.

(7) Per-mile user fee.--The term "per-mile user fee" means a revenue mechanism that--

(A) is applied to road users operating motor vehicles on the surface transportation system; and

(B) is based on the number of vehicle miles traveled by an individual road user.

(8) Pilot program.--The term "pilot program" means the pilot program established under subsection (b)(1).

(9) Volunteer participant.--The term "volunteer participant" means--

(A) an owner or lessee of a private, personal motor vehicle who volunteers to participate in the pilot program;

(B) a commercial vehicle operator who volunteers to participate in the pilot program; or

(C) an owner of a motor vehicle fleet who volunteers to participate in the pilot program.

(b) Establishment.--

(1) In general.--The Secretary, in coordination with the Secretary of the Treasury, and consistent with the recommendations of the advisory board, shall establish a pilot program to demonstrate a national motor vehicle per-mile user fee--

(A) to restore and maintain the long-term solvency of the Highway Trust Fund; and

(B) to improve and maintain the surface transportation system.

(2) Objectives.--The objectives of the pilot program are--

(A) to test the design, acceptance, implementation, financial sustainability of a national motor vehicle per-mile user fee;

(B) to address the need for additional revenue for surface transportation infrastructure and a national motor vehicle per-mile user fee; and

(C) to provide recommendations relating to the adoption and implementation of a national motor vehicle per-mile user fee.

(c) Parameters.--In carrying out the pilot program, the Secretary, in coordination with the Secretary of the Treasury, shall--

(1) provide different methods that volunteer participants can choose from to track motor vehicle miles traveled;

(2) solicit volunteer participants from all 50 States, the District of Columbia, and the Commonwealth of Puerto Rico;

(3) ensure an equitable geographic distribution by population among volunteer participants;

(4) include commercial vehicles and passenger motor vehicles; and

(5) use components of and, where appropriate, coordinate with--

(A) the States that received a grant under section 6020 of the FAST Act (23 U.S.C. 503 note; Public Law 114-94) (as in effect on the day before the date of enactment of this Act); and

(B) eligible entities that received a grant under section 13001.

(d) Methods.--

(1) Tools.--In selecting the methods described in subsection (c)(1), the Secretary shall coordinate with entities that voluntarily provide to the Secretary for use under the pilot program any of the following vehicle-miles-traveled collection tools:

(A) Third-party on-board diagnostic (OBD-II) devices.

(B) Smart phone applications.

(C) Telemetric data collected by automakers.

(D) Motor vehicle data obtained by car insurance companies.

(E) Data from the States that received a grant under section 6020 of the FAST Act (23 U.S.C. 503 note; Public Law 114-94) (as in effect on the day before the date of enactment of this Act).

(F) Motor vehicle data obtained from fueling stations.

(G) Any other method that the Secretary considers appropriate.

(2) Coordination.--

(A) Selection.--The Secretary shall determine which collection tools under

paragraph (1) are selected for the pilot program.

(B) Volunteer participants.--In a manner that the Secretary considers appropriate, the Secretary shall enable each volunteer participant to choose 1 of the selected collection tools under paragraph (1).

(e) Motor Vehicle Per-mile User Fees.--For the purposes of the pilot program, the Secretary of the Treasury shall establish, on an annual basis, per-mile user fees for passenger motor vehicles, light trucks, and medium- and heavy-duty trucks, which amount may vary between vehicle types and weight classes to reflect estimated impacts on infrastructure, safety, congestion, the environment, or other related social impacts.

(f) Volunteer Participants.--The Secretary, in coordination with the Secretary of the Treasury, shall--

(1)(A) ensure, to the extent practicable, that the greatest number of volunteer participants participate in the pilot program; and

(B) ensure that such volunteer participants represent geographically diverse regions of the United States, including from urban and rural areas; and

(2) issue policies relating to the protection of volunteer participants, including policies that--

(A) protect the privacy of volunteer participants; and

(B) secure the data provided by volunteer participants.

(g) Federal System Funding Alternative Advisory Board.--

(1) In general.--Not later than 90 days after the date of enactment of this Act, the Secretary shall establish an advisory board, to be known as the "Federal System Funding Alternative Advisory Board", to assist with--

(A) providing the Secretary with recommendations related to the structure, scope, and methodology for developing and implementing the pilot program;

(B) carrying out the public awareness campaign under subsection (h); and

(C) developing the report under subsection (n).

(2) Membership.--The advisory board shall include, at a minimum, the following representatives and entities, to be appointed by the Secretary:

(A) State departments of transportation.

(B) Any public or nonprofit entity that led a surface transportation system funding alternatives pilot project under section 6020 of the FAST Act (23 U.S.C. 503 note; Public Law 114-94) (as in effect on the day before the date of enactment of this Act).

(C) Representatives of the trucking industry, owner-operator independent drivers.

(D) Data security experts with expertise in personal privacy.

(E) Academic experts on surface transportation systems.

- (F) Consumer advocates, including privacy experts.
- (G) Advocacy groups focused on equity.
- (H) Owners of motor vehicle fleets.
- (I) Owners and operators of toll facilities.
- (J) Tribal groups or representatives.
- (K) Any other representatives or entities, as determined appropriate by the

Secretary.

(3) Recommendations.--Not later than 1 year after the date on which the advisory board is established under paragraph (1), the advisory board shall provide the Secretary with the recommendations described in subparagraph (A) that paragraph, which the Secretary shall use in implementing the pilot program.

(h) Public Awareness Campaign.--

(1) In general.--The Secretary, with guidance from the advisory board, may carry out a public awareness campaign to increase public awareness regarding a national motor vehicle per-mile user fee, including distributing information--

(A) related to the pilot program;

(B) from the State surface transportation system funding alternatives pilot program under section 6020 of the FAST Act (23 U.S.C. 503 note; Public Law 114-94) (as in effect on the day before the date of enactment of this Act); and

(C) related to consumer privacy.

(2) Considerations.--In carrying out the public awareness campaign under this subsection, the Secretary shall consider issues unique to each State.

(i) Revenue Collection.--The Secretary of the Treasury, in coordination with the Secretary, shall establish a mechanism to collect motor vehicle per-mile user fees established under subsection (e) from volunteer participants, which--

(1) may be adjusted as needed to address technical challenges; and

(2) may allow independent and private third-party vendors to collect the motor vehicle per-mile user fees and forward such fees to the Treasury.

(j) Agreement.--The Secretary may enter into an agreement with a volunteer participant containing such terms and conditions as the Secretary considers necessary for participation in the pilot program.

(k) Limitation.--Any revenue collected through the mechanism established under subsection (i) shall not be considered a toll under section 301 of title 23, United States Code.

(l) Highway Trust Fund.--The Secretary of the Treasury shall ensure that any revenue collected under subsection (i) is deposited into the Highway Trust Fund.

(m) Payment.--Not more than 60 days after the end of each calendar quarter in which a volunteer participant has participated in the pilot program, the Secretary of the Treasury, in consultation with the Secretary of Transportation, shall estimate an amount of payment for each volunteer based on the vehicle miles submitted by the volunteer for the calendar quarter and issue such payment to such volunteer participant.

(n) Report to Congress.--Not later than 1 year after the date on which volunteer participants begin participating in the pilot program, and each year thereafter for the duration of the pilot program, the Secretary and the Secretary of the Treasury shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report that includes an analysis of--

- (1) whether the objectives described in subsection (b)(2) achieved;
- (2) how volunteer participant protections in subsection (f)(2) were complied with;
- (3) whether motor vehicle per-mile user fees can maintain the long-term solvency of the Highway Trust Fund and improve and maintain the surface transportation system, which shall include estimates of administrative costs related to collecting such motor vehicle per mile user fees;
- (4) how the privacy of volunteers was maintained; and
- (5) equity impacts of the pilot program, including the impacts of the pilot program on low-income commuters.

(o) Funding.--

(1) In general.--Of the funds made available to carry out section 503(b) of title 23, United States Code, for each of fiscal years 2022 through 2026 \$10,000,000 shall be used to carry out the pilot program under this section.

(2) Excess funds.--Any excess funds remaining after carrying out the pilot program under this section shall be available to make grants for pilot projects under section 13001.

Appendix B: The User-Pay Paradigm

For the federal government to develop a national VMT-fee pilot, it is helpful to understand some overall theories of taxation, user-pay principles, and how they have been applied and evolved in the United States.

For centuries, there were two competing philosophical theories around which a just tax structure could be based. The first was to tax based on the taxpayer's *ability to pay* taxes (e.g. higher taxes for those with greater wealth or greater income); and the second was to tax based on the governmental *benefits received* by the taxpayer.

These two ideas were not always in opposition, as this debate dates back to the days before governments spent significant money on programs specifically benefitting the poor who lacked the ability to pay significant levels of tax. Adam Smith conflated the two in his First Maxim of Taxation: "The subjects of every state ought to contribute towards the support of the government, as nearly as possible, in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the state."⁷⁸

Ability taxation and benefit taxation began to diverge in the 1800s, with John Stuart Mill advocating ability taxation on its own, and later when Erik Lindahl (and, 35 years later, Paul Samuelson) took benefit taxation into the field of pricing public goods.⁷⁹ The pricing of public goods was later incorporated into the larger field of "public choice theory" by the work of James M. Buchanan beginning in 1962.

A related idea to benefit taxation was popularized by economist Arthur Pigou in 1928, who explored taxes levied to collect the costs of "spillovers," or "externalities" – defined as "costs borne or benefits enjoyed by one party due to activities of another party where no voluntary exchange or market transaction occurs."⁸⁰ The most widespread use of this principle has been in taxes to capture the effects of pollution.

An influential Congressional Budget Office report used the overall rubric of "user charges" to describe four different types of governmental income:

- ***Benefit-based taxes*** (if formally linked to spending accounts for programs specifically benefitting those taxpayers);
- ***Pigouvian liability-based taxes*** (if formally linked to spending accounts for programs specifically remediating the liabilities caused by those taxpayers);
- ***Actual "user fees"*** (fees paid for goods or services provided by the government, consumed voluntarily, and not shared by other members of society); and

- **"Regulatory fees"** (charges for the exercise of the government's power to regulate).⁸¹

In the United States, this user-pay paradigm has seen particularly wide use in the field of transportation spending.

B.1 User-Pay Policies at the State and Local Level

The user-pay paradigm for transportation originally began at the level of state government. However, as a 1954 study noted, "History reveals that no carefully worked out theory anteceded the adoption of user taxation as we know it today. The theoretical foundation, such as it is, was built after the framework was erected."⁸²

The idea of the users of a transportation facility paying for the use of that facility has been active at the state and local level since the Founding. The official history of the federal highway program recounts that, in the late 1780s, "there was widespread agitation for State assistance to help maintain the principal roads. The debt-burdened State governments met this challenge by appealing to private capital for the funds to build better highways. They chartered private turnpike companies, conferring on them authority to build roads and charge tolls to the public for their use."⁸³

Along with canals (which also charged tolls), the toll turnpike road dominated intercity travel until supplanted by the railroads starting in the 1830s. The railroads were like the turnpikes in that governments gave right-of-way to private companies in exchange for the private companies building infrastructure, but they differed in that with the railroads, the act of transportation itself was also carried out by the railroad company, so that the public user was paying for both the infrastructure access and the transportation activity thereupon, instead of only paying for infrastructure access under the turnpike model.

(Throughout the 19th Century, local roads were maintained by a "statute labor" system, which one could call "user-do" instead of "user-pay." Every able-bodied man in a county was required to spend a certain number of days in a year working on a road crew to maintain the roads in their area.)

The advent of the automobile in the late 19th Century, in combination with the other elements of the "Good Roads Movement," created significant pressure on states to provide better roads. At this time, the primary source of state revenue was the property tax, which was also the major source of road funding.⁸⁴

(This explains the "sliding scale" that increases the federal share of the cost of federal-aid highway projects in states where the federal government owns a high percentage of the land. That provision was enacted in 1921, when many states still paid for a majority of their road spending with property taxes. Yet somehow, the provision has remained in law long after all states switched from property taxes to the user-pay model, where the sliding scale—still codified in section 120 of title 23, United States Code—makes much less sense.)

The drive for states to raise general revenues from a new economic sector, and the need to increase spending on roads so they could support automobiles, eventually came together into a user-pay system. But it happened in stages. Mid-century historians broke the various auto-centric taxes and fees into three "structures":

Taxing the existence of vehicle itself. The first state to require that automobiles be registered, and to pay a registration fee, was New York in 1901, with a one-time perennial fee. By 1915, all states had enacted some sort of auto registration fee.⁸⁵

The best early history of the fees noted that in the beginning, the fees charged for the one-time-only registrations were so low that "little attention was given to the collection of revenue. After 1909, however...The growth of the revenue idea is apparent from the increase in the average rates, from the tendency to make the licenses annual instead of permanent, and, indirectly, from the attempt to secure a just distribution, evident in the graduation on the basis of horsepower."⁸⁶

A 1913 snapshot showed that most states varied the amount of the registration fee based on the horsepower of the vehicle's engine, following the British practice (more horsepower being more expensive, making it a progressive tax, and engine horsepower also being a good proxy for the Pigouvian externality of the dust stirred up by the vehicle's operation). Four states even had lower registration fees for electric vehicles because of their lower top speeds.^{87**}

States quickly began to dedicate their registration fees to the state road fund; by 1916, 42 of the 48 states dedicated at least part of their registration fees to highway purposes.⁸⁸ But the use of the fees to pay for roads created a "free rider" problem, which begat resentment of out-of-state motorists. Some states enacted interstate registration reciprocity with other states, but others did not.

** Electric vehicles are not a recent invention. In-fact they predate the internal combustion engine and were more popular until they were beaten out by the convenience and cheaper price point of the Ford Model-T. Kevin A. Wilson, "Worth the Watt: A Brief History of the Electric Car, 1830 to Present," Car and Driver, March 31, 2023. <https://www.caranddriver.com/features/g43480930/history-of-electric-cars/>

For example, "New York had full reciprocity with 15 other states but not with New Jersey. As a result, thousands of New Yorkers who had their summer homes on the Jersey coast had to register their machines for the full year in both States."⁸⁹ And things could get more aggressive: "General resentment and widespread resistance [to interstate registration requirements] occasioned the flaring up of so-called 'border tag wars' in various sections of the country...a funeral cortege, corpse and all, enroute to the place of interment in a State of non-registration was arrested and held until the drivers could be tried and fined and the hearse and the automobiles licensed and tagged."⁹⁰

Growth in the number of vehicles, and the money generated by annual registration fees, was exponential. In 1910, nationwide fee receipts totaled \$2 million. Ten years later, they had increased 45-fold, to \$102 million. Ten years after that, the 1930 receipts totaled \$356 million. (The number of registered vehicles only increased 18-fold from 1910-1920 and almost threefold to 1930, as the average amount of registration fee per vehicle climbed from \$4.88 in 1910 to \$12.49 in 1920 to \$15.48 in 1930.)⁹¹

Taxing the fuel on which the vehicle runs. The federal government taxed gasoline, along with other lamp and lantern fuels, briefly during the Civil War, and Congress debated taxing gasoline as a motor fuel several times during the 1914-1918 period, but nothing ever came of it.⁹²

The first taxation of gasoline as a motor fuel was left to Oregon, in February 1919, when they levied a 1 cent-per-gallon gasoline tax, levied at the wholesale level, as part of the means to pay for a new \$10 million bond issuance for road construction.⁹³

Two other Western states—New Mexico and Colorado—adopted similar gasoline levies so quickly after Oregon that it is unlikely that one state inspired another, and in both instances, the gas taxes went into the state road fund. Later that year, the road commissioners of the three states traveled to the annual meeting of the American Association of State Highway Officials in Kentucky and sold all the other state highway officials on the wonder of their new revenue source, after which, according to one historian, "There can be no doubt that all highway officials present were cognizant of the possibilities of a gasoline tax by the time they returned home, and state highway officials continued to be the chief source of gasoline tax agitation."⁹⁴

From then on, states adopted gasoline taxes remarkably quickly. At the end of 1919, only the three aforementioned states had adopted such taxes. Five years later, at the end of 1923, 31 states and the District of Columbia had adopted gasoline taxes. By the end of 1929, only a decade after Oregon went first, New York became the last holdout state to levy a state gasoline tax. The levels at the end of 1929 ranged from two cents per gallon to six cents per gallon.⁹⁵ See Figure 17,

FIGURE 17: STATE GASOLINE TAX RATES BY YEAR (cents per gallon)



For the animated time-series graphic, please refer to the following [link](#).

In most instances, MFTs enhanced, and did not replace, motor registration revenue. Half of the gasoline tax states had also increased registration fees since taxing gasoline, while only 13 percent of the gasoline tax states had lowered registration fees.⁹⁶

During the Great Depression, massive unemployment and stock market crashes severely reduced income tax revenues at the same time that deflation and defaults were hurting property taxes. But gasoline tax receipts by states remained remarkably robust, to the point that states began to divert more of their gasoline tax revenue to non-highway purposes. The federal Hayden-Cartwright Act of 1934 provided that any state would lose one-third of its annual federal highway funding if it diverted any additional gasoline tax revenue away from highways after June 30, 1935.⁹⁷ (This provision actually stayed on the books until being repealed in July 1998.)

At present, there is a wide discrepancy in state gasoline tax levels. There are two reliable data sources with differing methodologies. The American Petroleum Institute's calculations include all sales taxes, including regional taxes weighted by population within a state, and are best for showing the taxes as felt by the motorist. Those state and

local taxes range from a low of 15.13 cents per gallon in Alaska to a high of 68.15 cents per gallon in California, with a volume-weighted U.S. average of 38.69 cents per gallon.⁹⁸ The Energy Department only includes taxes specific to motor fuels, and they find that gasoline taxes in Alaska are just 8.95 cents per gallon while Illinois has moved into the lead with taxes of 67.4 cents per gallon and a national average of 31.63 cents per gallon.⁹⁹

A 1946 study commissioned for the California legislature found that "the ton-miles of operation per gallon of fuel were 57 percent greater for diesel trucks than for gasoline-powered trucks." As a way to treat both classes of trucks fairly (from the user-pay point of view), the report recommended that from then on, the diesel tax be increased to a level 50 percent higher than the gasoline tax, whatever the gasoline tax rate happened to be. (This was the original source of the idea that diesel tax rates should be higher than gasoline tax rates – not because commercial trucks do more damage to roads than smaller cars, but as a way to even out the per-mile tax burden between kinds of trucks.)¹⁰⁰

The federal government did not begin to track the use of diesel fuel on highways until 1949, but in that year, they estimated that about 75 gallons of gasoline were used on U.S. roads for every gallon of diesel similarly used. By 1959 the ratio had only dropped to 24 to 1, and to 13 to 1 by 1969. In 2021, the ratio of gasoline (and gasohol) to diesel (and other special fuels) use on American highways was 2.85 to 1.¹⁰¹

Today, state taxes on diesel fuel tend to be higher than the taxes on gasoline, but the discrepancy is now justified as part of higher tax rates on the trucking sector. The American Petroleum Institute estimates that state and local diesel taxes on highway use of diesel fuel range from a low of 15.08 cents per gallon in Alaska to a high of \$1.00 per gallon in California.¹⁰²

Taxing the use of the vehicle. If the first structure was taxing the existence of the vehicle itself, and the second structure was taxing the fuel used by the vehicle, the third structure was taxing the use of the vehicle. A groundbreaking 1968 study, *The Role of Third Structure Taxes in the Highway User Tax Family*, found that:

"...fuel consumption does not adequately reflect costs occasioned by vehicles of different types and weights. The registration tax based on the gross weight of the vehicle may be graduated in its application; however, the tax does not reflect the variation in mileage by the same vehicle from year to year nor the variation in mileage by different vehicles of the same type and gross weight. On the other hand, a third-structure tax, for example one based on weight and mileage, if a significant part of the total highway-user tax system, could counteract the (alleged)

shortcomings of the other two imposts. It is because of this that many jurisdictions impose some type of third-structure tax."¹⁰³

As of 1946 (the first year that *Highway Statistics* was published), 16 states and the District of Columbia levied some kind of weight-mile tax on commercial vehicle operation. 11 states also taxed the gross income of motor carrier companies specifically, and 13 states also issued annual weight-based taxes on motor carrier vehicles.¹⁰⁴

By 1965, in the face of widespread trucking industry opposition, the number of states levying gross receipts taxes had dropped from 11 to 6, and the number of states using some kind of weight-mile tax formula had dropped by one. 4 states taxed freight movement by the ton-mile, 7 states taxed by the weight-mile of the truck, 2 states levied an axle-mile tax, and 2 others had a flat vehicle-mile truck tax rate.¹⁰⁵

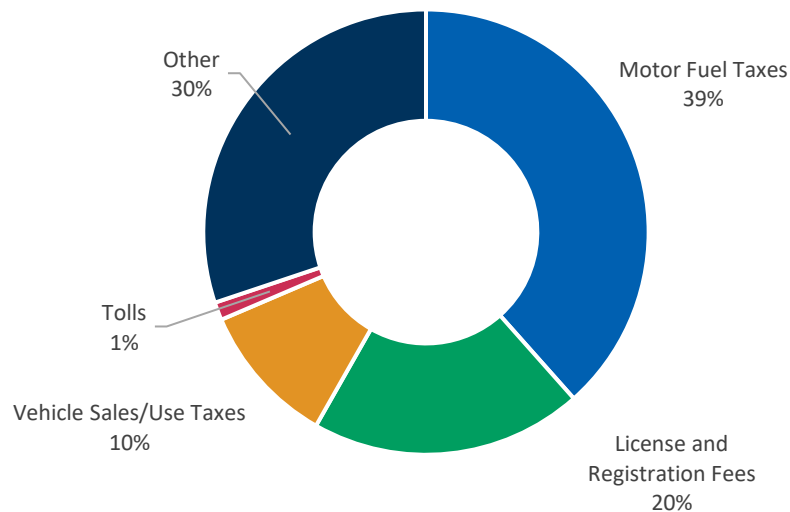
Since then, the federal deregulation of trucking in 1980, and the 1991 requirement for interstate cooperation in motor carrier fuel tax collection, crediting, and reciprocity, have led most states to abolish their third structure taxes. (This is also due to persistent opposition from the trucking industry over the years. The industry has consistently supported concentrating state trucking taxes into the first two structures – annual registration and motor fuels – for ease of compliance.) Four states still levy weight-distance taxes on motor carrier operation:

- All motor carriers operating in **Kentucky** with a combined license weight of 60,000 pounds or more must pay a flat rate of 2.85 cents per mile.¹⁰⁶
- All motor carriers operating in **New Mexico** with a declared gross vehicle weight of 26,000 pounds or more must pay a weight distance tax ranging from 1.1 cents per mile for trucks at the bottom end of the weight range to 4.4 cents per mile over 78,000 pounds. Discounted rates are charged for one-way hauls with empty return.¹⁰⁷
- All commercial vehicles operating in **New York** must pay a graduated weight-mile tax with multiple possible measures of weight (gross weight or unladen weight). The rates vary from 0.84 cents per mile for the lightest trucks (gross weight of 18,000 pounds) to 5.46 cents per mile for 80,000 pound trucks, plus 0.28 cents per ton or fraction of a ton per mile over 80,000 pounds. The state law gives discounted rates to trucks hauling wood products or dairy products.¹⁰⁸
- All commercial vehicles operating in **Oregon** with a registered weight over 26,000 pounds must pay a graduated weight-mile tax ranging from 7.2 cents per mile for trucks barely over 26,000 pounds to 23.7 cents per mile for trucks at 80,000 pounds. For trucks over 80,000 pounds, an axle-weight computation is used that tops out at 33.3 cents per mile.¹⁰⁹

Unfortunately, the FHWA has ceased updating Table MV-2 in its *Highway Statistics Series*, which lists annual state tax receipts from various motor carrier taxes, after the 2009 edition, leaving the official record vacant. But back in 2009, receipts from the four state weight-mile taxes were: Kentucky \$76.9 million; New Mexico \$81.3 million; New York \$98.7 million, and Oregon \$196.2 million.

The National Association of State Budget Officers (NASBO) estimated that, in fiscal year 2022, state governments paid for 74 percent of their transportation spending (excluding the pass-through proceeds of federal grants) with funds taken from a dedicated transportation fund, with the remaining 26 percent split roughly evenly between state general fund appropriations and bond proceeds.¹¹⁰ Within those dedicated transportation funds, revenue sources are shown in the chart below.

FIGURE 18: STATE TRANSPORTATION FUND REVENUE SOURCES, FY 2022



Source: NASBO 2022 State Expenditure Report, Table A-5

B.2 Federal User Charge Policy

The federal government began levying user charges at the Founding, in the form of postal fees (paid by the recipient until the advent of sender-purchased postage stamps in the 1840s).¹¹¹ By 1900, postal user charges still represented 15 percent of total federal revenues (and paid for all Post Office Department expenses).¹¹²

In 1918, some national parks began charging parking revenues.¹¹³ In January 1940, President Roosevelt proposed small public admissions fees for parks, national forests, and historic monuments in order to offset the cost of park roads, trails, and facilities. He also suggested charging the public for the cost of federal aid to maritime transportation ("dredged channels, buoys, lighthouses, lifesaving stations, and so forth"). Roosevelt wrote that "It would seem reasonable that some portion of these annual expenditures should come back in the form of small fees from the users of our lakes, channels, harbors and coasts."¹¹⁴

World War II interrupted the development of the user-pay paradigm at the federal level, but in January 1947, President Truman was the first to propose a general user charge principle: "the Government should receive adequate compensation for certain services primarily of direct benefit to limited groups." Like Roosevelt, Truman singled out the field of transportation: "For example, I believe that a reasonable share of the cost to the Federal Government for providing specialized transportation facilities, such as airways, should be recovered."¹¹⁵

In April 1951, the House Subcommittee on Independent Offices Appropriations included, in its fiscal 1952 spending bill, a general provision expressing the sense of Congress that government work done for a specific person or group should be "self-sustaining to the full extent possible," and that the President should levy "fair and equitable" fees, charges and prices to do so. Interestingly, the appropriations bill went through the House and Senate floor with no mention whatsoever of this provision during debate. The bill was signed into law on August 31, 1951.¹¹⁶

That language, as modified, remains on the books today, expressing the "sense of Congress that each thing of value provided by an agency...to a person...is to be self-sustaining to the extent possible."¹¹⁷

This law was implemented quickly by the Bureau of the Budget via the issuance of Circular A-25 in November 1953, requiring federal agencies to charge fees for licensing, registration, and related activities (including Civil Aeronautics Board, Civil Aviation Administration, Interstate Commerce Commission, and Coast Guard certification and inspection services), and again in January 1954 with Circular A-28, requiring agencies to charge for copying, certification, and search of records.¹¹⁸

In 1957, the Eisenhower Administration decided to build on this principle and requested, in Budget Bureau Bulletin 58-3, that all federal agencies draft legislation allowing them to "recover full costs for Government services which provide a special benefit." The Budget Bureau then issued a new version of Circular A-25 in September 1959 (and folded the old Circular A-28 into it), which provided additional guidance,

including on the question of whether specific user fees should be fungible with general revenues or earmarked for a specific spending program.¹¹⁹

Every President from Franklin Roosevelt through Joe Biden has endorsed the user-pay principle in general and endorsed specific user-pay rationales for certain transportation charges, taxes and fees, in their annual budget messages. (For a complete list of every instance in which a President has mentioned transportation user charges in the budget, see the Eno website.)^{††}

Office of Management and Budget (OMB) Circular A-25 governing user charges was last amended in 1993 and is still active. Section 7c of the current version mentions the operational differences between a user fee and a user tax: "Excise taxes are another means of charging specific beneficiaries for the Government services they receive. New user charges should not be proposed in cases where an excise tax currently finances the Government services that benefit specific individuals. Agencies may consider proposing a new excise tax when it would be significantly cheaper to administer than fees, and the burden of the excise tax would rest almost entirely on the user population (e.g., gasoline tax to finance highway construction). Excise taxes cannot be imposed through administrative action but rather require legislation. Legislation should meet the same criteria as in Section 7b; however, it is necessary to state explicitly the rate of the tax."¹²⁰

In fiscal year 2022, OMB estimated that the federal government took in \$572 billion in user charges, which, by OMB definition, does not include those excise taxes (such as those supporting the HTF) that are used in lieu of user fees.¹²¹

B.3 Nomenclature and the Constitution

In public debate, the term "user fee" has often been used to describe a benefit-based or liability-based excise tax. Politically this is understandable, but constitutionally it is usually incorrect. The Constitution has two clauses that have led federal courts, and Congress itself, to set strict standards for what is a "bona fide" user fee.

Origination Clause. Article I, Section 7, Clause 1 provides that the Senate may not originate "Bills for raising Revenue" – only the House of Representatives may do so. But the Supreme Court held in 1897 (and reaffirmed in 1990) that "a bill creating a discrete governmental program and providing sources for its financial support is not a revenue bill simply because it creates revenue..."¹²²

^{††} Transportation User Charge Proposals in the President's Budget, 1941 to Present: <https://enotrans.org/article/transportation-user-charge-proposals-in-the-presidents-budget-1941-to-present>

The most recent prominent example of a Senate-originated user fee is the aviation security fee charged to all enplaning air passengers to defray a portion of the Transportation Security Administration's screening costs. The fee was originated in a Senate bill that became law in 2001.¹²³

The Origination Clause is enforced by the House of Representatives far more often than it is enforced by the courts.¹²⁴ In the past, the Speaker of the House, together with the House Parliamentarian, have expressed that the House's own enforcement of the Origination Clause (the "blue slip" rejection of Senate revenue bills) "will continue to be viewed broadly to include any meaningful revenue proposal that the Senate may attempt to originate." But the same announcement also listed specific criteria for House committees other than Ways and Means to write their own bona fide user fees.¹²⁵

Export Clause. Article I, Section 9, Clause 5 provides that "No Tax or Duty shall be laid on Articles exported from any State." But the courts have ruled that this clause does not apply to bona fide user fees.

The most recent statement by the Supreme Court was in 1998, when the Court invalidated the Harbor Maintenance Tax (a levy of 0.125 percent of the cargo moving in and out of U.S. seaports, deposited in the Harbor Maintenance Trust Fund, and to be used to defray Army Corps of Engineers costs for harbor dredging) as it was applied to exports. The Court held that because the tax was based on the value of the cargo (not the "size and tonnage of the vessel, the length of time it spends in port, and the services it requires"), it did not "correlate reliably with the federal harbor services used or usable by the exporter" and was thus a tax, not a bona fide user fee.¹²⁶

The federal gasoline excise tax is not a user fee under these standards for several reasons. (It is labeled a "tax" in statute; it is part of the Internal Revenue Code; it is levied "upstream" at the refinery, causing non-highway users to have to pay the tax and then apply for a refund or a tax credit, and when first levied in 1932, it was not formally linked to road spending.) But a charge on vehicle mileage could, conceivably, be structured as a bona fide user fee.

B.4 Classifying, and Accounting For, Federal User Fees and Taxes

The federal budget essentially has two separate sets of books – one for the spending side of the budget, and the other for the receipts side. The sum totals of the two sets of books are compared on a daily, monthly, and annual basis to determine the size of the federal deficit (or surplus). All accounts in the federal budget, generally speaking, are classified as either spending accounts or receipt accounts.¹²⁷

From the first centralized federal budget in 1921 through late 1960s, user fees were shown on the receipt side of the budget (except for those the Post Office and, later, government-owned corporations like the Tennessee Valley Authority, which were netted against total department/corporation spending). That earlier treatment was overruled by the 1967 final report of the President's Commission on Budget Concepts, which still governs budget practice today.

The Commission recommended that "For purposes of summary budget totals, receipts from activities which are essentially governmental in character, involving regulation or compulsion, should be reported as receipts. But receipts associated with activities which are operated as business-type enterprises, or which are market-oriented in character, should be included as offsets to the expenditures to which they relate."¹²⁸

The most recent President's Budget explains: "Offsetting collections and offsetting receipts are recorded as offsets to spending so that the budget totals for receipts and (net) outlays reflect the amount of resources allocated by the Government through collective political choice, rather than through the marketplace... Offsetting receipts and offsetting collections are recorded in the budget in one of two ways, based on interpretation of laws and longstanding budget concepts and practice. They are offsetting collections when the collections are authorized to be credited to expenditure accounts. Otherwise, they are deposited in receipt accounts and called offsetting receipts."¹²⁹

But that still leaves out excise taxes like those used to defray federal highway and transit spending. After describing how the purchase of postage stamps to defray part of the cost of delivering a letter should qualify as a bona fide user fee and be treated as negative spending, the Commission's report said:

"A different treatment is indicated, however, in the exercise of the Government's sovereign tax powers for the collection of highway excise taxes. The proceeds of such tax collections are earmarked for highway construction [via the HTF]. Even though the taxpayer may regard such excise taxes as a 'price for services rendered,' the individual taxpayer's contributions are not in any direct way related to the particular highway services provided by the Government. The Federal Government retains complete allocative authority over the collected taxes and the taxpayer may never use the resource constructed or provided by the Government out of the highway excise taxes earmarked for the general purpose of highway construction. Accordingly, the collection of highway excise taxes and the expenditures for highway construction should not be netted in the budget."¹³⁰

Whereas true user fees can be applied directly to an account or agency budget on the spending side of the budget, defraying some or all of their expenses and reducing the net level of spending, this is not possible for benefit-based and liability-based taxes, which must be kept on the receipts side of the budget, because they are based on the sovereign power of the government to raise revenue. The only way to link tax receipts to a specific spending account, program or agency is through the creation of a trust fund – a visibility exercise to link a specific tax with specific spending programs over multiple years.

Appendix C: State VMT-Fee Pilots

List of state VMT-fee pilots and programs referenced in this report.

- Oregon Road User Fee Pilot (2006)¹³¹, Road Usage Charge Pilot Program (2013)¹³², The OReGO Program (2015)¹³³
- Minnesota Road Use Test (2011)¹³⁴, Minnesota Distance-Based Fees Project (2018)¹³⁵
- Colorado Road Usage Pilot Program (2016)¹³⁶
- Washington Forward Drive (2018)¹³⁷
- California Road Charge Pilot Program (2016)¹³⁸, California Road Charge Four-Phase Demonstration (2021)¹³⁹
- Utah’s Road Usage Charge (2020)¹⁴⁰
- Hawaii: HIRUC (2019)¹⁴¹
- Virginia Mileage-Based User Fee Program (2022)¹⁴²
- Nevada Odometer Reading Pilot Program (2019)¹⁴³

Endnotes:

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- ² Federal Highway Administration, "December 2022 Traffic Volume Trends," U.S. Department of Transportation, December 2022. https://www.fhwa.dot.gov/policyinformation/travel_monitoring/22dectvt/figure1.cfm
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- ¹² Dwight D. Eisenhower. "Statement by the President Upon Signing the Federal-Aid Highway Act of 1954," May 6, 1954. *Public Papers of the Presidents of the United States: Dwight D. Eisenhower*, 1954 (Washington: GPO, 1960), document 102 on pp. 459-460.
- ¹³ Federal Highway Administration. *Highway Statistics* series (various years), Table VM-1.
- ¹⁴ EIA *Annual Energy Outlook 2023*, Table 49, Freight Transportation Energy Use, Reference Case.
- ¹⁵ Section 210 of the Highway Revenue Act of 1956, 70 Stat. 374, 401.
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