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16. ABSTRACT

The gasoline tax is one of the primary sources of revenue for transportation infrastructure funding. However, recent revenue shortfalls due to a combination of inflation, fuel efficiency improvements, and vehicle electrification have led to discussions of alternative funding mechanisms such as the road user charge where drivers would pay fees by miles driven rather than gallons consumed. In this report, we investigate the institutional structure of the current gasoline tax at the federal level including historical changes, how the tax is collected, and how it is allocated and disbursed to fund infrastructure projects. In outlining the structure of the current gasoline tax, we identify key opportunities for a road user charge to be integrated into the current funding system. These include considerations for tax evasion, simplification of state level allocated disbursement formulas, re-allocation of funds, and designating spending for fuel-specific infrastructure.

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for Sustainable Transportation

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for Sustainable
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Federal Road Charge Tax Administration Process

A National Center for Sustainable Transportation Research Report

March 2020

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Federal Road Charge Tax Administration Process

EXECUTIVE SUMMARY

The revenue and purchasing power of funds raised from federal gasoline taxes was decreased over time due to a combination of factors (from most to least significant) including inflation, improvements in the average fuel economy of new vehicles, and vehicle electrification. As revenue shortfalls have continued to grow over the last several decades, Congress has begun to inject funds for transportation infrastructure directly from the general fund. Alternative funding mechanisms to the gasoline tax are beginning to enter policy conversations—several states have already conducted pilot programs to test the feasibility of a road user charge (RUC) that requires drivers to pay by the mile rather than by the gallon. We conduct a deep dive into the administration of the current federal gasoline tax in order to determine the institutional barriers and opportunities for a new funding mechanism to operate alongside or replace the gas tax.

The federal gasoline tax is relatively cheap to administer, since the tax is generally assessed once the fuel leaves the bulk storage terminal. However, the site of fee collection does not typically represent where the fuel is consumed as terminals may not reside in the same state as where fuel is ultimately dispensed at gas stations. Therefore, an accounting of fuel consumption by state is required to accurately determine how revenues should be disbursed. After the Internal Revenue Service assesses the gasoline tax, the majority of funds are then transferred to the Highway Trust Fund and the Mass Transit Account. The spending of funds in these accounts is authorized through a special Congressional authority granted via transportation infrastructure investment legislative bills.

Much of the institutional structure related to the gasoline tax could be retained in an alternative funding scheme such as the road user charge. However, there are both potential benefits and difficulties associated with the implementation of a mileage-based fee. While there is currently a fairly robust anti-tax evasion program, the scale of such a program required for a RUC would be significantly larger since the number of collection points would increase from hundreds (for terminals) to hundreds of millions (for individual vehicles). On the other hand, state allocation of fees would be significantly simplified as the points of collection would be significantly more correlated with the final allocation of funds compared to the location of bulk fuel terminals. A small portion of funds from the current gasoline tax is spent on infrastructure specific to the fuel (underground storage tanks). As the road user charge is technology ambivalent, some mechanism would need to be determined to allocate among different fuel types—this determination could ultimately have a significant impact on the development and support for infrastructure for newer technologies such as electric vehicles or hydrogen fuel cell vehicles.

Introduction

The primary source of transportation infrastructure revenue in the United States comes from fuel taxes (in 2015, about \$36.7 billion of \$41.8 billion of the Highway Trust Fund was from fuel taxes). Both gasoline and diesel, which represent the lion's share of fuel use, are taxed at the federal and state levels. These fees have served to help build and maintain roads, bridges, and other transportation infrastructure across the country. Unfortunately, the gasoline tax suffers from several drawbacks that hamper its ability to continue providing adequate funding in the future:

- 1. Inflation:** The federal fuel tax (and the majority of state fuel taxes) are static and do not adjust for inflation over time. This means purchasing power of the revenue from fuel taxes decreases over time, hampering the ability of transportation departments across the US to fund projects. Since the previous change in the federal gasoline tax in 1993, a \$1 item would be worth only \$0.55 cents today when adjusting for inflation. To exacerbate this issue, inflation is not applied uniformly across all goods and services and studies have shown that transportation infrastructure inflation increases at a faster rate than average (Qin 2014).
- 2. Fuel Economy:** Due to the Corporate Average Fuel Economy standards (CAFE, which requires automakers to improve the fuel efficiency of vehicles they sell over time), vehicles traveling the same number of miles will consume less gasoline-- thereby decreasing revenues from gasoline taxes. While the improvements in fuel efficiency provide savings for consumers and lower negative externalities, it also means that fuel fees become less effective over time. Over the course of the most recent fuel economy improvement standards, the average passenger has improved from 27.5 miles per gallon (MPG) to 30.6 MPG—this amounts to a decrease of about \$8 per vehicle comparing a 2010 to 2020 vehicle model. These differences will accumulate across the fleet of new vehicles being sold in the United States (on the order of 15 million per year).
- 3. Electric Vehicles:** In addition to the fuel efficiency improvements, consumers are transitioning to alternative fuel vehicles such as plug-in electric vehicles (PEVs). Plug-in hybrid electric vehicles (PHEVs) consume significantly less gasoline and full battery electric vehicles (BEVs) do not consume any gasoline at all. As the volume of these new vehicle technologies increase, gasoline consumption will decrease and thus lead to lower revenues for transportation infrastructure. The reduction on a per-vehicle basis is significantly larger than the effect of fuel efficiency—an average of \$70 per vehicle. However, the magnitude of electric vehicle adoption is substantially smaller (on the order of 300,000 new PEVs per year).
- 4. Politics:** The deficiencies of the current structure of the gasoline tax can be addressed with small adjustments to existing policy. Unfortunately, gasoline taxes are a political landmine, historically whenever the tax has been changed there has been significant

political backlash and social unrest^{1,2,3}. As a result, federal fuel taxes have remained static for over two decades.

It is important to note that the issue of inflation is by far the most dominant factor affecting future revenue outlays of the federal gasoline tax (affects revenue from almost all vehicles). Fuel economy improvements impact revenue to a smaller extent (affects revenue from almost all new vehicles), while the adoption of electric vehicles makes a significantly smaller marginal impact (affects revenues based on the sales of new electric vehicles). Nevertheless, these issues point to a future in which the federal fuel tax will no longer be adequate to fund the US transportation infrastructure.

Road user charges (RUC), a mileage-based fee (paying by the mile instead of paying by the gallon), is becoming popular as a potential replacement for the current gasoline tax's role in funding transportation infrastructure. There are some immediate benefits of mileage fee: the RUC does not suffer from changes to vehicle technology (either fuel economy improvements or adoption of alternative fuel vehicles) and can be structured to adjust for inflation (while the latter can be implemented in a gasoline tax, the political hurdles of doing so might be avoided with a completely new fee). This study conducts a deep-dive of the administration of the federal fuel tax in order to identify the mechanisms and potential opportunities for a RUC to integrate into the current process for raising revenue for transportation infrastructure funding.

A History of the Gasoline Fuel Tax in the United States

Oregon passed the first state gasoline tax in 1919 and over the course of the next decade many other states followed suit with fees ranging from \$0.02 to \$0.07 per gallon. In 1934, the first federal gasoline tax was passed in the United States at just \$0.01/gal⁴. At the start of World War II, the gas tax was increased⁵ to \$0.015/gal from July 1940 through July 1945 as part of a defense tax to support wartime efforts. This rate was made permanent the following year⁶. Under the auspices of the Korean War, Congress once again increased the gasoline tax rate to \$0.02/gal in 1951⁷. Congress subsequently granted several extensions of the gasoline tax rate through 1957⁸.

¹ James McAuley. "France suspends fuel tax after weeks of unrest". *The Washington Post* (2018). https://www.washingtonpost.com/world/france-suspends-controversial-fuel-tax-after-weeks-of-unrest/2018/12/04/d32577a6-f7b6-11e8-8d64-4e79db33382f_story.html

² Roger Harrabin. "Fuel protests costs treasury 2 bn yearly". *BBC News* (2004). http://news.bbc.co.uk/2/hi/uk_news/3716346.stm

³ Nidhi Verma. "Indian opposition calls nationwide protests to take on Modi over fuel prices". *Reuters* (2018). <https://www.reuters.com/article/us-india-election-fuel/indian-opposition-calls-nationwide-protests-to-take-on-modi-over-fuel-prices-idUSKCN1LM28D>

⁴ Revenue Act of 1932, P.L. 154, 72nd Congress

⁵ Revenue Act of 1940, P.L. 656, 76th Congress

⁶ Revenue Act of 1941, P.L. 250, 77th Congress

⁷ Revenue Act of 1951, P.L. 183, 82nd Congress

⁸ Excise Tax Reduction Act of 1954, P.L. 324, 83rd Congress; Tax Rate Extension Act of 1955, P.L. 18, 84th Congress; Tax Rate Extension Act of 1956, P.L. 458, 84th Congress

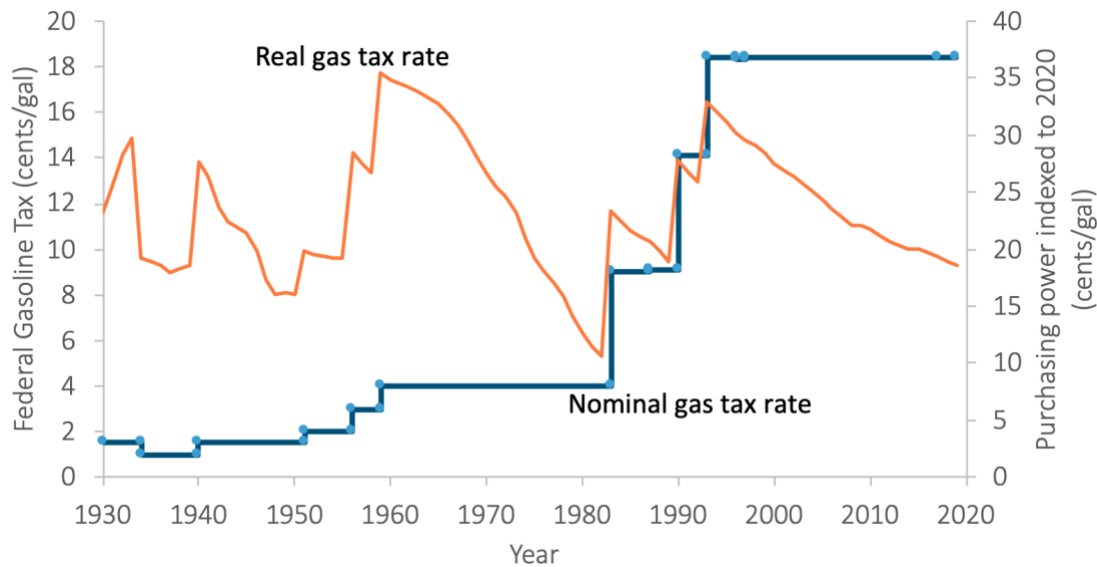


Figure 1. A history of the federal gasoline tax (nominal) rate.

In 1956, Congress passed the Federal Aid Highway Act⁹, an important piece of legislation that authorized federal funding to expand the federal highway system and remains the backbone of federal transportation funding today. The second part of the bill appropriated and financed the highway program through the Highway Revenue Act of 1956, which increased the federal gasoline tax to \$0.03/gal and created the Highway Trust Fund (HTF) which appropriates funds from the General Fund of the Treasury of the US (primarily from fuel taxes). At this point, all gasoline tax receipts were transferred into the HTF. Following the establishment of the HTF, Congress passed several bills over the next several decades to both increase/extend the gasoline tax rate (up to \$0.04/gal)¹⁰. The Surface Transportation Assistance Act of 1982¹¹ and the Deficit Reduction Act of 1984¹² again increased the gas tax from \$0.04/gal up to \$0.09/gal, established a special Mass Transit Account (MTA) within the HTF, and required a portion of fuel taxes be directed to the MTA (approximately 1 cent per gallon). An additional increase in the gas tax of \$0.01/gal was introduced in 1986 to establish the Leaky Underground Storage Tank (LUST) Trust Fund, which funds cleanup of underground petroleum storage tanks.

In 1990, Congress passed the Omnibus Budget Reconciliation Act¹³ (OBRA). Once again, the gasoline tax was raised by an additional 5 cents up to \$0.141/gal, but this time half of the increase was designated to the General Fund of the Treasury for deficit reduction. This was a sharp departure from previous practices, where revenue from the gasoline tax was allocated exclusively to the HTF. Allocating revenues to the General Fund was intended to be temporary

⁹ Federal-Aid Highway and Highway Revenue Act of 1956, P.L. 627, 84th Congress

¹⁰ Federal-Aid Highway Act of 1959, P.L. 86-342; Federal-Aid Highway Act of 1961, P.L. 87-61; Federal-Aid Highway Act of 1970, P.L. 91-605; Federal-Aid Highway Act of 1976, P.L. 94-280

¹¹ Surface Transportation Assistance Act of 1982, P.L. 97-424

¹² Deficit Reduction Act of 1984, P.L. 98-369, H.R. 4170

¹³ Omnibus Budget Reconciliation Act of 1990, P.L. 101-508, H.R. 5835

and set to expire on September 30, 1995. However, Congress passed another Omnibus Budget Reconciliation Act¹⁴ in 1993 which increased the gas tax by 4.3 cents (total of \$0.184/gal), extended the allocation to the General Fund from the 1990 OBRA through October 1, 1995, and directed the new increase in the gas tax to deficit reduction as well. The use of fuel taxes to pay down the deficit led to political division and ultimately led to a bi-partisan committee to investigate the disbursement of the tax. This led to the Tax Relief Act of 1997¹⁵ that redirected the revenues from the General Fund back to the HTF. The historical status of the HTF can be seen in Figure 2.

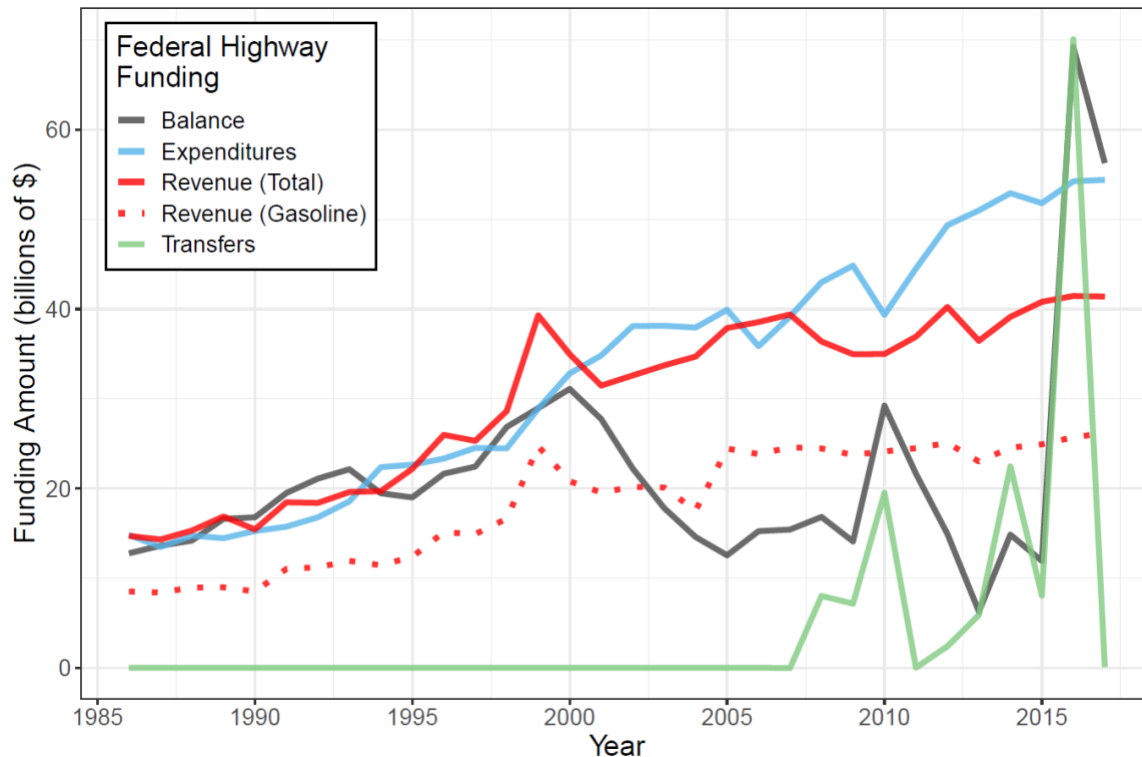


Figure 2. Annual revenues, annual expenditures, and the balance of the Federal Highway Trust Fund from 1985-2017 (all nominal dollars). The portion of revenues coming from gasoline taxes is shown as a dotted-line. Due to inflation and increasing fuel efficiency, the revenue (red) begins to diverge from expenditures (blue) beginning in the mid-2000's. Due to declines in the balance of the HTF, Congress began making transfers from the General Fund of the Treasury into the HTF beginning in 2008 to maintain the balance.

Since the federal gasoline tax rate has remained essentially static since 1993, the effects of inflation and improving fuel efficiency in the U.S. vehicle fleet eventually led to outlays surpassing revenues. As seen in Figure 2, the balance of the HTF began steadily decreasing in the early 2000's. To ensure transportation projects would be able to pay their bills, Congress began making transfers from the General Fund (though some funds have also been transferred

¹⁴ Omnibus Budget Reconciliation Act of 1993, P.L. 103-66, H.R. 2264

¹⁵ Taxpayer Relief Act of 1997, P.L. 105-34

from the LUST fund) into the HTF. In more recent years, there have been several large transfers that have replenished the available funds within the HTF—most notably a \$52 billion transfer in 2017 that increased the balance of HTF to its highest level of its existence.

When considering the historical challenges of the gasoline tax, we find there are several important lessons as it pertains to the future implementation of a federal road user charge:

- **Flexibility:** Any changes to the gasoline tax requires an act of Congress. This can be particularly difficult as the tax is politically contentious in the United States—leading to a static rate that has remained unchanged for over 25 years. While Congress can provide direction to the overall needs for transportation infrastructure funding, there have been suggestions¹⁶ to allow some flexibility for funding mechanisms to change the amount they charge automatically (such as indexing to total fuel consumption). This will be a vital consideration during the establishment of a future federal RUC.
- **Fund allocation:** We do not advocate for a particular funding system, whether infrastructure funding comes from user paid fees (i.e., gasoline taxes) or from the General Fund and whether user fees should be specifically allocated to infrastructure funding or if they should be paid into the General Fund. However, these issues should be considered when a road user charge, particularly to provide some immunity to temperamental politics.
- **Stability:** As the gasoline tax rate remains stagnant, its effective buying power has diminished due to inflation. This has led Congress to transfer funds from the General Fund to maintain the HTF. While the overall demands of the transportation sector can be difficult to forecast, issues such as inflation can easily be addressed in a new funding mechanism such as the RUC.

Further discussion of these principles can be found in the “Considering a Road-User Charge” section.

Collecting Fuel Taxes

Entities that are subject to the gasoline excise tax include blenders, pipeline operators, refiners, terminal operators, vessel operators (transporting gasoline), and producers of alcohol/biofuel for blending with gasoline. Each of these entities must “register” with the Internal Revenue Service (IRS) and are subject to monetary penalties if they fail to do so. The US DOT is required to allocate a small portion of their fuel tax revenues (currently \$2 million per year) to the IRS for intergovernmental enforcement efforts, research, and training. The federal gasoline tax is collected by the IRS and is assessed when gasoline leaves the bulk transfer/terminal system, which consists of refineries, pipelines, vessels, and bulk storage terminals. The vast majority of the tax is assessed once gasoline leaves the bulk storage terminals, typically through tank cars, railcars, trailers, trucks, or other forms of ground transportation. While a tax is assessed to each

¹⁶ Max Baumhefner. “A simple way to fix the gas tax forever”. August 2, 2019. <https://www.nrdc.org/experts/max-baumhefner/simple-way-fix-gas-tax-forever>

of the registered entities (mentioned above) when the fuel leaves their system, if the fuel remains in the bulk transfer/terminal system the entity is exempt from paying taxes (see Figure 3).

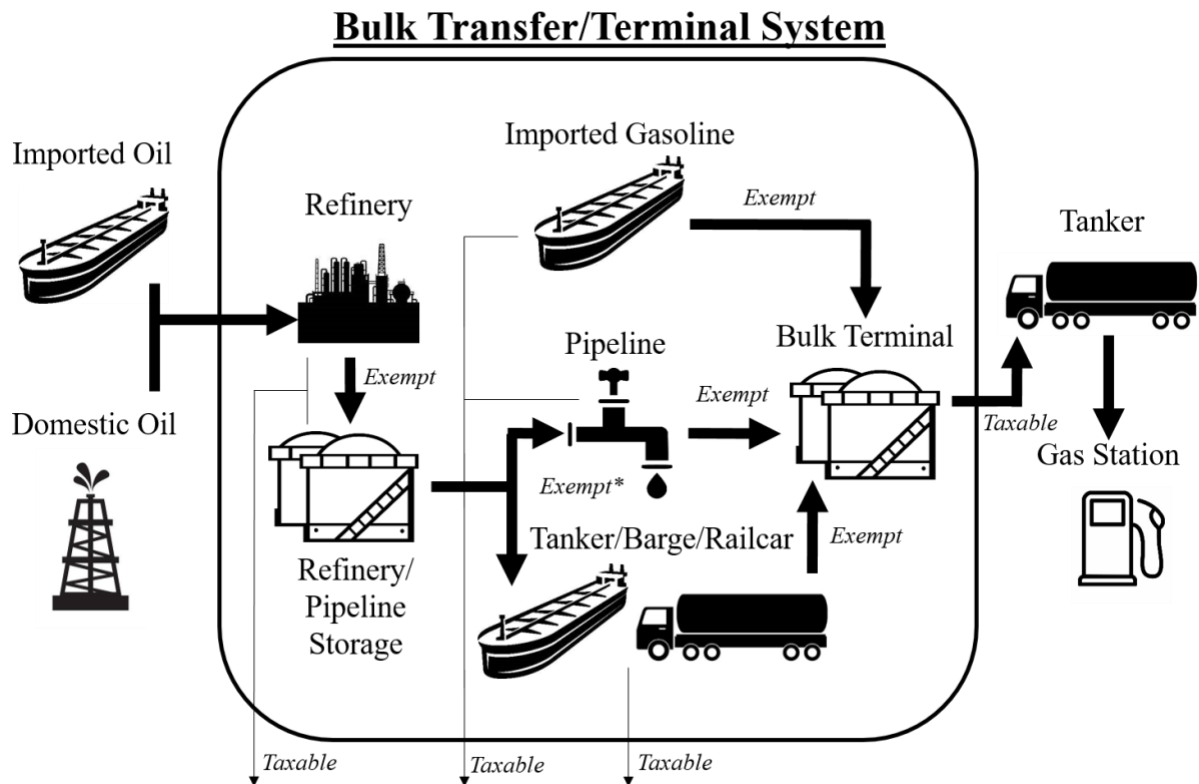


Figure 3. A simplified diagram of the gasoline supply chain in the United States. Oil/gasoline flows are denoted with arrows, whenever these arrows leave the bulk transfer system (the black border box) then the fuel is subject to the excise tax. Generally, the components of the bulk transfer/terminal system are required an excise tax on gasoline but are exempt as long as the fuel is transferred to other entities in the system. While this typically means that most of the tax is assessed once it leaves the bulk terminal, small quantities of gasoline are taxed at any point the fuel leaves the system. *Note that vessels are exempt from taxes but tankers are not, if a tax is assessed twice then refunds for the second tax are allowed.

Besides gasoline (octane rating of 75 or higher), blends of gasoline with alcohol including gasohol (10% ethanol), gasoline blend-stocks, and ethanol face the same excise tax rate (produced from coal; if produced from natural gas, ethanol receives a partial exemption and is taxed at \$0.114/gal instead of the full \$0.184/gal). The excise tax is still volumetric based on the quantity of the blend-stock, not the raw gasoline. In other words, one gallon of 90% gasoline blended with 10% ethanol still pays the same \$0.184 as one gallon of 85% gasoline blended with 15% ethanol.

Registrants responsible for paying fuel taxes do so monthly, via IRS Form 720¹⁷. Taxes are deposited to the General Fund of the Treasury and an amount equal to the total taxes are transferred into the HTF on a bimonthly basis¹⁸. These transfers are generally estimated by the Secretary of the Treasury and adjusted in subsequent transfers once receipts are received. If a tax is paid on the same volume of gasoline more than once, each subsequent tax is eligible for a refund. This may occur within the bulk transfer/terminal system for entities that are not exempt from the tax, for example: a tanker that transports gasoline from a refinery to a bulk terminal (the tax will be assessed when the gasoline leaves the refinery and again once it leaves the rack of the bulk terminal).

A small portion of money raised from fuel taxes has historically been used to fund the Internal Revenue Service to pursue tax evasion projects related to enforcement of motor fuel taxes. In the most recent laws regarding the Highway Use Tax Evasion Program¹⁹ (continued through the FAST Act), the IRS is provided administrative funds up to \$4 million annually with \$2 million for intergovernmental enforcement efforts (including research and training). The enforcement efforts include maintaining a comprehensive registration system for pipelines, vessels, and barges of the bulk transfer system, assisting states in their tax collection efforts of both domestic and imported motor fuel, and operating/maintaining an electronic database for heavy vehicle use tax payments (for the Heavy Vehicle Use Tax [HVUT], not the International Fuel Tax Agreement [IFTA]).

Disbursement of Funds

Funding and spending funds for federal programs requires special authority from Congress. This is typically achieved through authorizing legislation or an appropriations act. The Federal Highway Administration (FHWA) receives a special type of budget authority from Congress known as “contract authority”. Contract authority provides FHWA with authorization to spend funds without further legislative action. Contract authority is a relatively rare form of budget authority but since more than 90% of its receipts are from user taxes, the HTF qualifies to use this exceptional authority. One of the benefits of this authority is that states are provided advanced notice once the authorization is enacted, thus eliminating uncertainty in a typical appropriation process.

Authorization acts for the Federal-aid Highway Program have included the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)²⁰; Transportation Equity Act for the 21st Century (TEA-21, passed in 1998)²¹; Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU, passed in 2005)²²; Moving Ahead for Progress in the 21st

¹⁷ <https://www.irs.gov/pub/irs-pdf/f720.pdf>

¹⁸ Section 9601 of the Internal Revenue Code of 1986, classified to 26 U.S.C. 9601

¹⁹ US Code Title 23. Highways Section 143: Highway Use Tax Evasion Projects

²⁰ Intermodal Surface Transportation Efficiency Act of 1991, P.L. 102-240

²¹ Transportation Equity Act for the 21st Century, P.L. 105-178

²² Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, P.L. 109-59

Century Act (MAP-21, passed in 2012)²³; and most recently Fixing America's Surface Transportation Act (FAST Act, passed in 2015). The FAST Act authorized \$226 billion in budget authority (with \$225 billion in contract authority) over five years from 2016 through 2020. Programs funded by the HTF through the FAST Act include the National Highway Performance Program (NHPP), Surface Transportation Block Grant Program (STBG), Highway Safety Improvement Program (HSIP), Congestion Mitigation and Air Quality Improvement Program (CMAQ), Metropolitan Planning, and the National Highway Freight Program (NHFP). Once funds are distributed to states (described below), the authorization requires states to use certain sums of the funds for specific purposes, such as dedicating funds for the highway programs mentioned above.

Additionally, the FAST Act transferred additional funds from the General Fund and from the LUST Trust Fund to maintain solvency for the HTF's balance. Similar to the HTF, the LUST Trust Fund is allocated to states' regional EPA offices based on states' contributions to the fund. The majority of the funds are spent on administration, oversight, and cleanup of underground storage tank sites (around 80% annually) but Congress has appropriated money from the LUST Trust Fund for other needs. For example, in recent years Congress transferred funds to the HTF from LUST.

Figure 4 shows the location of bulk storage terminals for refined oil, gasoline, and ethanol in the United States. While the IRS generally collects the majority of gasoline taxes from these terminals (which are operated by a relatively small number of corporations), it is important to note that the locations of the gasoline distribution system are not directly related to the location of gasoline consumption. Because the fuel taxes are meant to fund transportation infrastructure for where end users *consume* the fuel, disbursement of revenues to states is not proportional to the amount of gasoline taxed in each state. Therefore, while taxes are collected from a small number of entities, the funds raised from the gasoline tax are distributed back to states based on the amount of gasoline consumed within each respective state. States report the gallonage of motor fuel taxes within each state (for all uses) for each type of fuel on a monthly basis. The total fuel consumption for each fuel can be determined from the tax from the combination of excise and sales taxes on all volumes of fuels. The FHWA then analyzes the data and develops attribution estimates based on state-unique procedures for attributing revenues to allocate fuels used on different types of roads (national highway, state highway, local roads, etc.).

²³ Moving Ahead for Progress in the 21st Century Act, P.L. 112-141

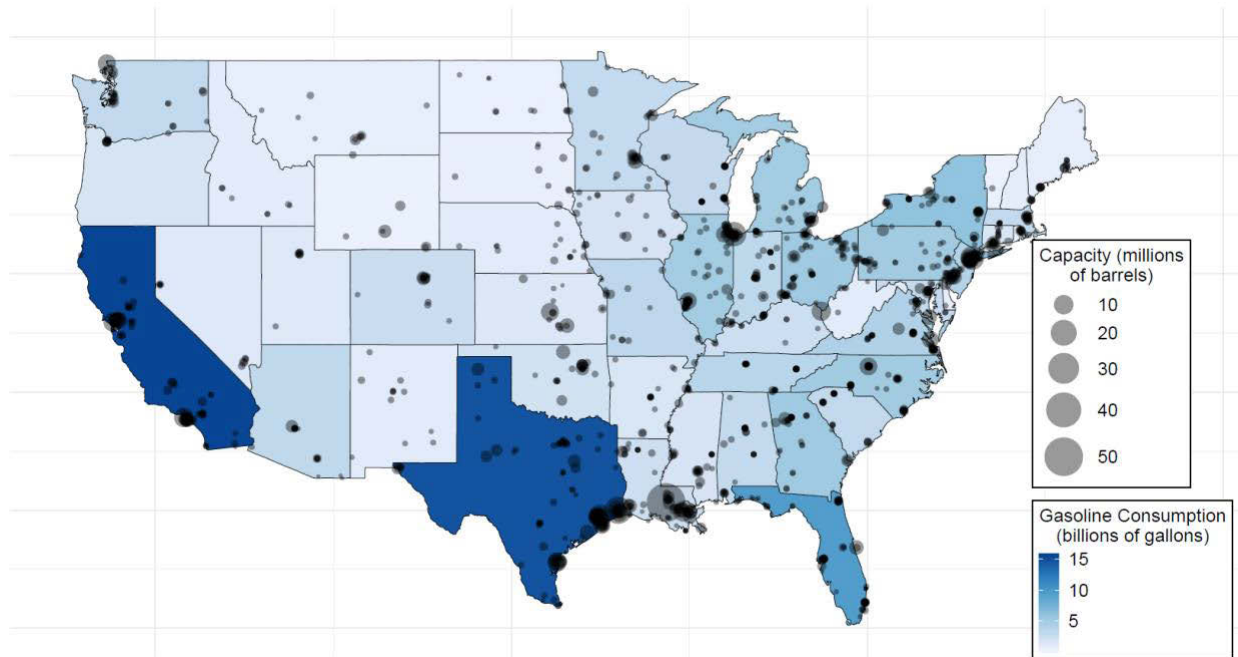


Figure 4. Bulk storage terminal of gasoline, ethanol, and refined oil locations in the continental United States (dots) and non-federal highway gasoline consumption reported by each state (shading). The size of the dots corresponds to the storage capacity of the terminals (in millions of barrels of fuel). Note that the relative amount of gasoline consumption in each state does not correspond to the amount of storage in each state.

Once authorized, funds are either “apportioned” or “allocated”. Funds that are apportioned must be distributed by statutory formula while funds that are allocated are distributed on some other basis. Under the FAST Act, apportionment combines a single national amount for all highway programs. 92% of funds in the HTF are apportioned by statutory formula while the remaining approximately 8% of funds are allocated on a different basis.

The majority of highway funds under the most recent authorization act (Fixing America’s Surface Transportation Act, FAST) is apportioned such that each state receives at least 92% of the funds they contributed into the HTF. This requirement is a balance of attribution and equity: the United States has to balance need for a national, connected highway system while maintaining an equitable return on each states' contributions. While some states are considered “donor” states (those that pay more in taxes than they receive), other states are considered “done” states (those that receive more in taxes than they pay), the authorization programs have included equity adjustments to ensure that each state is not disproportionately paying taxes or receiving funds relative to other states. However, there are statutory penalties to enforce national policies that may decrease a state’s full apportionment. This mechanism is a method through which national transportation regulations can be enforced, including compliance with minimum drinking age, use of safety belts, vehicle weight limitations, commercial driver's license requirements, etc. Penalties can be in the form of withheld apportionments, transfer to other states, dedicated funds to help the state reach compliance,

or even suspension of already apportioned funds. A fraction of funds apportioned to each state must be used for specific purposes including state planning and research, transportation alternatives, and allocations to specific block grant programs for high- and low-density regions. The remaining non-apportioned funds are allocated to states typically for qualifying projects that meet certain criteria.

Once funds are obligated (promised to be paid by the federal government), states may spend the funds over a period of time when the funds are available. Since many projects span several years, outlay (transfer of funds) to the states may not happen in the same year that funds are obligated, though most funding on average (over 80%) are spent within the first three years of obligation. Additionally, the HTF typically covers only 80% of a project's costs, thus requiring projects to have some matching funds from state/local governments or other sources. This percentage depends on the project, for example the interstate system is typically funded at a higher 90%. Due to the multi-year nature of authorizations and availability of funds, and the fact that the authorizations are exempt from annual review, there is a ceiling placed on the total obligations that can be made within a single year.

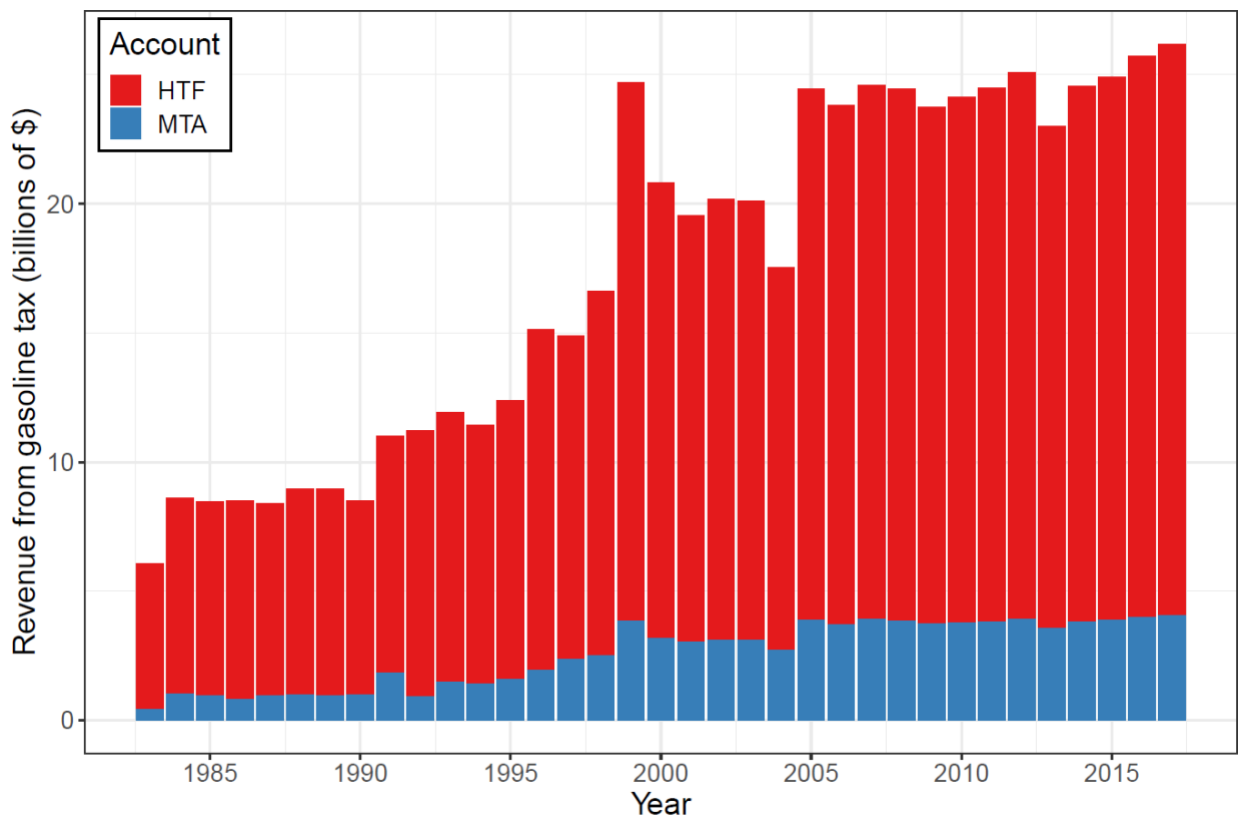


Figure 5. Annual revenues from the federal gasoline tax, broken down by allocations into the Highway Trust Fund (HTF) account and the Mass Transit Account (MTA).

The disbursement of funds back to the states do not, in principle, need to differ between a gasoline tax and a road user charge. However, a future pricing mechanism would need to

navigate a new set of rules through the legislature. It would likely be beneficial for a road user charge to retain many of the benefits specific to the current gasoline tax in the authorization (particularly contract authority), appropriation, obligation, and outlay of funds. The system has recognized and dealt with important issues such as distribution of funds, balancing states' equity against national infrastructure needs, flexibility in multi-year contracts/projects, and penalties for compliance with federal transportation standards. It will be critical to consider these elements in the development of a future road pricing scheme.

Considering a Road-User Charge

While the federal gasoline tax appears to be a fairly simple mechanism for raising funds for transportation infrastructure, administration of the fee has been developed and refined for nearly a century. A RUC program must navigate an entirely new fee system as well as the apportionment/allocation, obligation, and outlay system. In some respects, the RUC is better suited to certain administrative issues, while in other areas the program may face new challenges. We delve into these issues in this section.

Perhaps the biggest difference with the administration of a road user charge—compared to the federal fuel tax—is the collection of fees from users. Local and state pilot programs (such as those in Oregon, California, and Washington) have considered a variety of mechanisms to record travel distances and payment procedures. The IRS could collect fees from every individual (if the system is linked directly to each car through an Onboard Unit Device or RFID tag), from every gasoline station (for “pay-at-the-pump” programs), or from a relatively smaller number of aggregators (if the program is operated through a third-party administrator). Additionally, while much of the reporting of fuel consumption and fee collection occurs at a monthly period, depending on the payee of the road user charges, the periods may need to be adjusted to accommodate the payment mechanism. For instance, aggregation of reporting from many sources may dictate longer time periods.

Tax evasion for federal fuel taxes is a relatively small issue, and while the IRS and US DOT receive funding for anti-evasion activities, the amount represents a negligible fraction of the disbursed funds from fuel taxes. One of the reasons that fuel tax evasion is easier to enforce is because there are a small number of actors and control points to consider. There are on the order of several hundred bulk terminals and several thousand other miscellaneous points of collection for fuel taxes in the United States. In contrast, a road user charge must enact the fee on a vastly larger number of endpoints- hundreds of millions of vehicles. Cheating a single device or reporting mechanism could occur at a much smaller scale but with greater frequency in a RUC. Enforcing this program may not be cost effective and as a result the loss of revenue from individuals avoiding RUC fees could potentially be substantially higher than the losses from fuel taxes.

For a new fund program, Congress would need to provide budget authority to the road user charge derived fund. However, since the downstream program of the road user charge would be “self-funded” (similar to how the operations of the Highway Trust Fund are funded primarily through fuel taxes rather than the general fund), Congress could arguably endow contract

authority to it in the same manner it does the HTF. Having a separate fund program for a RUC would enable Congress to approach the fund disbursement from an entirely new slate—for example, allowing for a change in the allocation between highways and mass transit, or even allowing for new funding options. However, a new fund for revenues collected may not be entirely necessary. In fact, it would be possible for the RUC to become a supplementary (and eventually replacement) of the current federal fuel taxes into the HTF. If this were to happen, a new apportionment/allocation algorithm would need to be derived since the current program is based on fuel consumption. The disbursement of funds to states would likely be significantly more accurate (since the current system relies on estimates from each state since the revenue at the rack doesn't correspond to consumption of the final fuel). However, a different challenge would be posed in that a measurement procedure would be required for interstate travel.

An issue related to the LUST Trust Fund is that the gasoline tax provides an avenue of funding for maintaining infrastructure of the fuel distribution system. However, the allocation of funds for a road user charge would not be as straightforward because it spans across multiple fuel types. The extent to which gasoline infrastructure should be paid by road user charges from vehicles using gasoline would require both an accounting of the miles travelled and the fuels corresponding to each mile. For the most part tracking the fuel related to each mile can be assessed based on the vehicle fuel type (which in itself is an additional administrative burden), but this issue becomes significantly more complex when considering dual-fuel vehicles such as plug-in electric vehicles (PHEVs) that have the ability to use both gasoline and electricity to power their drive-train. While this issue is fairly insignificant today (due to low volumes of PHEVs), if the vehicles are more widely adopted in the future, some consideration of how to track fuel-miles will be necessary to accurately account for contribution to the LUST Trust Fund from gasoline RUC vehicle miles. Alternatively, the fund could be budgeted rather than rely on a portion of fuel consumption—this would both simplify the accounting and create stability in revenue streams into the fund (at the cost of becoming disproportionate to the HTF).

Discussion and Conclusion

A RUC could be used to help remedy the transportation funding shortage for the HTF due to 1) inflation, 2) continuing improvements to fuel efficiency, and 3) electrification of on-road vehicles. While fuel efficient cars and electric vehicles are beneficial for air quality and public health, they still damage roads and cause other negative externalities such as congestion. A RUC will provide a "user-based fee" to account for these negative externalities that do not depend on how much fuel is used, but the miles driven.

The structure of the supply chain of gasoline and diesel have historically dictated the logistics for administration of the federal fuel tax benefit. The number of taxable entities from refining, transporting, and storing fuel (refineries, pipelines, and bulk storage terminals respectively) is relatively small, allowing for better tracking of fuel flows, enforcement of payment, and collection of fees. In comparison, a road user charge would be significantly more complex prior to the fee being collected. However, once funds are collected, the funds would be distributed similarly; although Congress would need to develop new rules on the allocation and apportionment of the funds coming from a RUC fee. Many of the federal formulas for

apportionment are based on the quantity of fuel consumed in each state. A RUC could avoid these estimates if the miles travelled are tied to a specific location through on-board diagnostics.

Many of the current developments in road user charges in the United States involve technical implementation including measurement and tracking of miles, reporting, and the administration of fees. These items are necessary to demonstrate that a RUC program is feasible. This report provides insight into the necessary next steps for the RUC at the federal level: what considerations should be made in funding, how the RUC funds integrate with the federal fuel tax system, and what opportunities are there for a RUC program to improve the current system. Perhaps the simplest transition would be integrating funds into the existing Highway Trust Fund and LUST Trust Fund. Nevertheless, modifications would be needed based on fuel consumption to accommodate differences with the RUC (based on miles instead of fuel consumption).

With strategic implementation and considerations for distribution, a RUC could help improve the transportation system by increasing funding for transportation and ensuring a fair collection and distribution system.

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Data Management

Products of Research

All data in this study are publicly available and accessible online. The data we gathered was primarily from government databases about highway and infrastructure funding statistics from the US Department of Transportation.

Data Format and Content

Data are exclusively in tabular format, available online for download in Excel, CSV, or pdf data formats.

Data Access and Sharing

Data can be accessed online.

Reuse and Redistribution

There are no restrictions on data use. We used the following data sources:

- U.S. Department of Transportation, Federal Highway Administration. Policy and Governmental Affairs: Office of Highway Policy Information. “Highway Statistics Series”. <https://www.fhwa.dot.gov/policyinformation/quickfinddata/qffuel.cfm>
- U.S. Department of Transportation, Highway Trust Fund. “Status of the Highway Trust Fund”. <https://www.fhwa.dot.gov/highwaytrustfund/>
- U.S. Department of Transportation, Federal Highway Administration. Policy and Governmental Affairs: Office of Highway Policy Information. “Motor Fuel & Highway Trust Fund”. https://www.fhwa.dot.gov/policyinformation/motorfuelhwy_trustfund.cfm
- Homeland Infrastructure Foundation-Level Data. “Petroleum Terminals”. https://hifld-geoplatform.opendata.arcgis.com/datasets/7841aba67178425cbf33995fc914e2fe_0/data