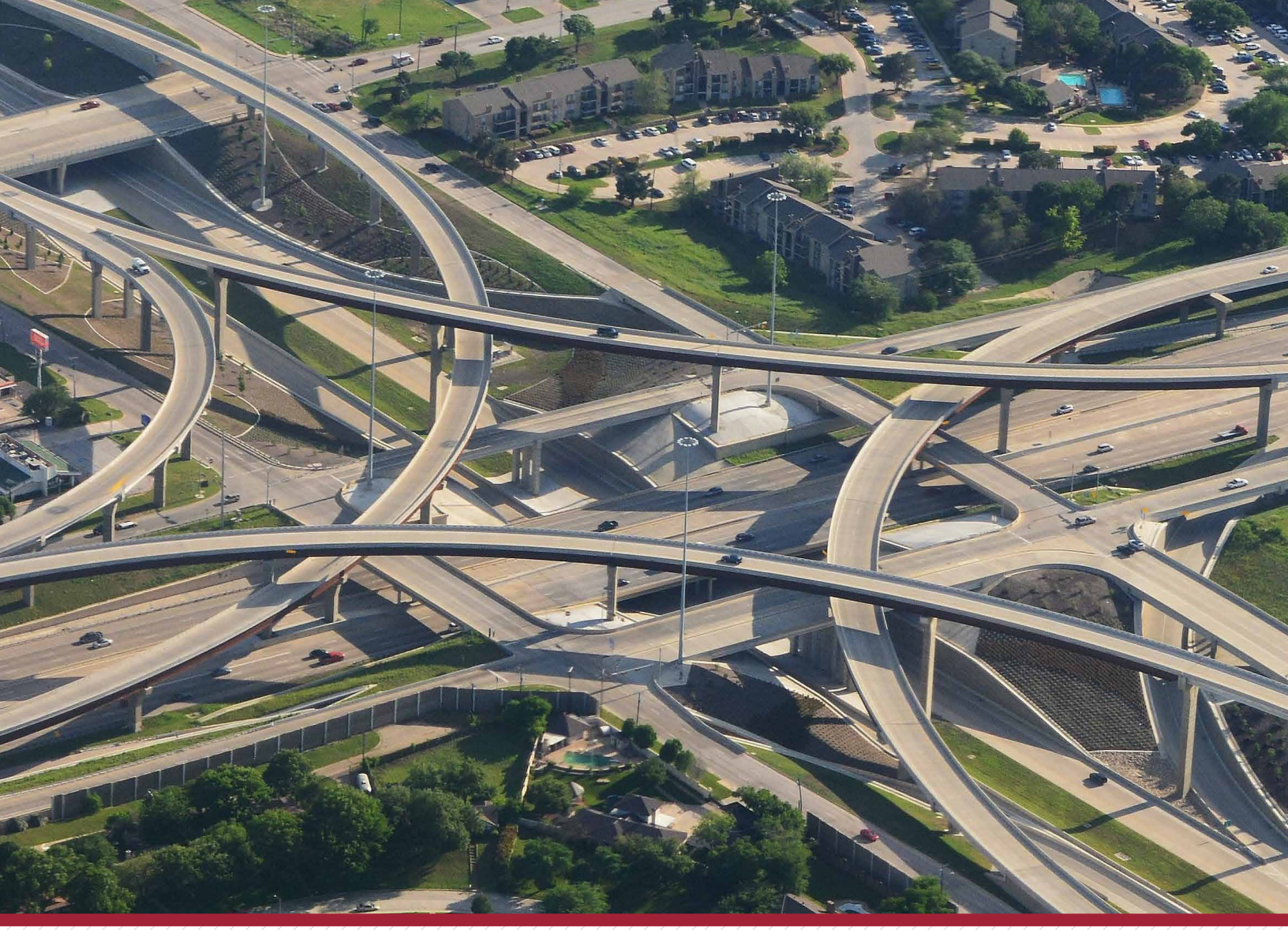

Shifting Gears

How we pay for transportation, why it's not working, and how to fix it

U.S. PIRG Education Fund

FRONTIER GROUP

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Executive summary

THE U.S. SYSTEM **of transportation finance is broken.** Created a century ago to fund the build-out of the nation's road network, the system was designed to funnel revenues from gas taxes and motor vehicle fees into "trust funds" devoted to highway construction and maintenance. That system succeeded in financing the construction of the most expansive highway network in the world. But it is failing America today.

Too much money is wasted on boondoggle projects, even as critical 21st century transportation needs go unmet. The original bargain at the heart of the system – that drivers would bear the costs of building and maintaining the roads they use – has been broken, with decision-makers at all levels spending increasing amounts of general tax revenue on roads to avoid raising gas taxes. By making driving relatively cheap and convenient – and options such as transit, biking and walking difficult and expensive – the transportation finance system is a formidable obstacle to building a cleaner, healthier and more livable America.

America cannot address the challenges of the 21st century with a transportation finance system created in the horse-and-buggy era. The nation should build a new system based on two simple principles:

- Charge transportation taxes and fees that reflect the full costs – including health and environmental costs – that Americans' transportation choices impose on society.
- Prioritize spending on transportation projects based on the benefits they deliver to society.

The transportation funding bargain has broken down. America's transportation system was built on a simple idea: drivers would pay for the cost of the roads they use through gas taxes and motor vehicle fees. So-called "user fees" never completely covered the full cost of the roads, but today, the gap is wider than ever.

- Gas taxes and other fees on drivers pay for only around half of the total cost of building and maintaining roads nationwide, and often less than that.[1] Since 2008, Congress has channeled more than $153 billion in general revenues to the federal Highway Trust Fund – shifting the burden of highway construction from those who drive to all Americans, even those who rarely or never drive or who don't even own a car.[2]
- Drivers have never covered the other costs they impose on society – from noise pollution to air pollution to climate change. These costs are massive and growing, well outstripping the direct costs of road maintenance. For example:
    - **Motor vehicle crashes:** Approximately 39,000 Americans die in car crashes every year, and millions more are hospitalized with serious injuries.[3] In 2020, the estimated financial cost of motor-vehicle deaths, injuries and property damage totaled more than $474 billion.[4]

- **Air pollution:** Air pollution from road transportation is thought to be responsible for at least 58,000 deaths in the U.S. each year, although more recent research suggests that this figure itself is a significant underestimation.[5] One study estimates the annual cost of damage caused by air pollutants nationwide to be up to $277 billion, 16% of which is attributable to cars, light-duty trucks and SUVs.[6] The air pollution-related damage caused by driving is an estimated $10.7 billion to $41.6 billion per year.[7]
- **Climate change:** Transportation is the largest single source of U.S. greenhouse gas emissions. In 2020, gasoline consumption from transportation resulted in the emission of around 948 million metric tons (MMT) of carbon dioxide (CO_2) and diesel consumption emitted 428 MMT.[8] Assuming a social cost of carbon of $51 per ton of CO_2, the total cost of emissions from gasoline consumption in the transportation sector is $48.3 billion and diesel emissions $21.8 billion.[9]

Our transportation finance system lavishes funding on wasteful boondoggle projects while leaving today's most important transportation needs unmet.

- In 2014, the latest year for which data is available, federal, state and local governments spent $26 billion on highway expansion projects. Highway expansion has limited benefits and contributes to auto dependence, sprawl, and damage to the environment and public health.[10]
- At the same time, the nation's aging highways and transit systems have massive unmet repair needs. America's transportation infrastructure repair backlog currently totals more than half a trillion dollars, including $435 billion needed for road repair and $125 billion for bridge repair.[11] The U.S. Department of Transportation estimates a backlog of over $105 billion for transit infrastructure in need of replacement.[12]
- Federal transportation policies incentivize highway expansion and include no requirements that states prioritize spending on repairs or long-term maintenance. They also make it easier to fund highways (for which federal funding can cover 80% or more or the cost) than transit projects (which typically receive a federal match of 40% or less and require proof that each new project has the funds required for rehabilitation or maintenance).
- Many state governments have transportation finance policies that are even more skewed toward highway construction. About half the states prohibit the use of gas tax revenue for transit, while nine states spend less than $1 per person per year on average on state support of public transportation.[13]
- Critical 21st century transportation needs – such as enhancing safety for people on bikes or on foot – receive only minimal federal funding.

America's system of transportation taxes and fees often makes highly damaging modes of travel cheaper than sustainable ones.

- Driving is subsidized directly through the use of general funds for road maintenance and construction, and through tax code provisions such as state sales tax exemptions on motor fuels and the income tax exclusion for commuter parking benefits. Tax subsidies to U.S. motorists alone amount to between $25 billion and $83 billion per year, equivalent to between $210 and $708 per U.S. household.[14]
- Since 1990, average transit fares have increased 143%, while the federal gas tax has not been increased since 1993.[15]

- Concerns that the rise of electric vehicles (EVs) will exacerbate the growing transportation funding shortfall (since they don't use gas, and thus don't pay gas tax) have led some states to impose registration fees and other charges on EVs that can make it more expensive to drive an EV than a gas-powered car.[16]

Raising the gas tax, or increasing other forms of transportation revenue, won't solve these problems on their own. America must adopt a new system of transportation funding based on two principles:

Charge taxes and fees on transportation that reflect the full costs Americans' transportation choices impose on society.

- Cleaner, healthier and more sustainable forms of transportation – like riding a bus or a bike –should ideally be cheaper than dirtier and more dangerous modes, like driving, and transportation taxes and fees should be oriented toward encouraging the use of the least-impactful mode for every trip.
- Specifically, policymakers should:
    - Impose taxes or fees that recover the cost of pollution, road wear, congestion and other societal impacts imposed by vehicle use. This can be in the form of impact-specific taxes and fees (e.g., congestion pricing, carbon taxes, VMT taxes, parking charges) or increased fuel taxes or other taxes that act as a proxy for a mode's impact on society.
    - Ensure that fees are differentiated by vehicle size and fuel used. Large vehicles should pay higher fees than small ones; fossil fuel vehicles should pay higher taxes and fees than electric ones. Until such time as gasoline and other fuel taxes increase to better approximate their true impacts, governments should avoid adopting EV fees that could slow adoption of cleaner vehicles.
    - Price public transportation to account for the benefits transit trips deliver to society. Transit trips should be priced relative to the marginal cost of providing them, and the cost of a transit trip should be lower than a competing car trip to incentivize mode shift.

Prioritize spending on transportation projects based on the benefits they deliver to society.

- America should prioritize investments that address the nation's biggest challenges and avoid wasteful boondoggle projects.
- Specifically, policymakers should:
    - Treat transportation taxes and fees as taxes and use the revenue for the purposes with the greatest benefit to society. This means ending the dedication of revenues from transportation taxes and fees to support the modes from which they were raised.
    - Eliminate provisions in federal and state law that encourage spending on wasteful highway projects. Ensure that transit, biking, walking and demand reduction policies are treated at least equally to – and ideally are given preference over – highway projects.
    - Adopt clear goals to guide transportation investments. These should include goals to reduce climate pollution, reduce air and water pollution, reduce crashes and deaths, expand transportation options and access to destinations, and support thriving, healthy communities.

Breaking the link between how transportation revenue is raised and how it is spent would bring the United States into closer alignment with transportation funding practices in the rest of the developed world. Examples from abroad indicate that a system in which driving pays its true costs and revenues collected from drivers are deposited in a general fund instead of being dedicated exclusively to transportation would not only bring in sufficient revenue to finance necessary improvements to the country's transportation system, but also leave funds left over to invest elsewhere.

- Drivers in the **United Kingdom** pay relatively high fuel taxes, including a percentage-based, value-added tax and an excise tax.[17] However, these revenues are not ringfenced for transportation, but are instead deposited into the UK's Consolidated (general) Fund. In 2011, total UK public spending on transportation amounted to only 72% of total fuel tax revenues (and less than a third of fuel tax revenue was dedicated to roads), the remainder staying in the general fund for use on other societal priorities.[18]
- In **Germany**, transportation investment comes from general taxation and individual states' transportation funding in large part comes out of the federal coffers.[19] Gasoline is taxed at a significantly higher level than the U.S., bringing in more revenue each year than the country's total annual federal transportation spending, but these revenues are not dedicated solely to transportation. Germany also has a partial user-pay system in the form of per-mile tolls for heavy trucks on certain federal highways, revenues from which are dedicated to road-related projects.[20]

Introduction

ONE OF THE MOST PERSISTENT fallacies underpinning U.S. transportation policy is that roads "pay for themselves." According to this narrative, the cost of building and maintaining roads is covered by gas taxes, registration fees and other driving-related fees paid by the "users" of those roads – i.e., drivers. These revenues, the theory goes, are not "taxes," conventionally understood, but "user fees," and as such should be used exclusively for the benefit of those who pay them.

Like many enduring myths, this conception of transportation finance has some basis in reality – or at least, the reality of a century ago. In 1919, Oregon became the first state to adopt a per-gallon tax on gasoline, which was used to fund roadbuilding projects including the Pacific Highway and the Columbia River Highway.[21] Within a little over a decade, every state and the District of Columbia had followed Oregon's model.[22] The federal fuel excise tax was initially levied in 1932 as a deficit reduction measure at the height of the Great Depression, but the current federal gas tax, adopted in 1956, was dedicated specifically to funding construction of the Interstate Highway System.[23] As the U.S. built out its road network, taxes on drivers, often put into "trust funds" dedicated exclusively for use on highways, covered the lion's share of the cost.

This system of transportation funding was designed to facilitate the construction of high-quality roads at a time when there were few of them. While it may have made sense for a nation building a brand-new highway network, a century later it no longer does. In fact, it is holding the nation back.

Continuing to allocate transportation dollars as though road construction were the nation's main transportation priority prevents us from getting to work on the real transportation priorities of the 21st century: keeping our already massive road network in good repair, reducing our nation's contribution to climate change, curbing air pollution, reducing the number of transportation-related deaths and injuries, and expanding the availability of a wider range of sustainable transportation options – from rail travel to electric bikes – to more Americans, including those who don't, or can't, drive.

Refusing to charge transportation system users for the full impact of their choices on society – not just wear and tear to the roads, but also emissions, congestion, noise and more – results in a large and persistent economic subsidy for more travel in bigger, more dangerous and more highly polluting vehicles, exactly the opposite of the direction in which the nation needs to go.

We need to envision a new finance system that addresses the transportation needs of the 21st century. In this white paper, we suggest such an approach.

The "bargain" at the core of the current system – that drivers would cover the costs of roads and have full use of money from the gas tax for that purpose – no longer applies. Our approach to pricing and paying for transportation has to move beyond the antiquated formulas designed to serve the needs of an America that no longer exists, and focus on the transportation needs of today.

In the early 20th century, policymakers designed a system of transportation finance geared to the needs of the times. Today, in the early 21st century, it is time for policymakers to reimagine our transportation finance system to do the same.

The U.S. system of transportation finance is broken and obsolete

AMERICA'S TRANSPORTATION SYSTEM is the nation's leading contributor to climate change, kills roughly 39,000 people on the roads each year and injures millions more, produces air pollution that cuts short the lives of tens of thousands of people each year, and leaves millions of Americans stuck in traffic every morning and evening, while tens of millions more who cannot or do not drive are left without good transportation options, or else are entirely stranded.[24]

These problems are rooted in, and have been perpetuated by, America's system for raising and spending transportation funds – a system created in the early years of the 20th century to build out the nation's road network – which is now generations behind the times. Changing how the dollars flow is a critical step toward fixing the nation's longstanding transportation problems.

To develop a better system of transportation finance, it is first important to identify where the current system goes awry. In short: America's transportation funding raises money in the wrong ways and spends it on the wrong things, incentivizing modes of travel that leave all of us worse off.

The transportation funding "bargain" has broken down

Roads don't pay for themselves. But many Americans believe they do.

Like many enduring myths, the idea that the gasoline taxes and other fees that road users pay cover the cost of highway maintenance has its roots in the truth. In the early 20th century, America had few good roads. With automobile use growing, the demand for road construction and improvement grew. But how would the nation pay for the massive capital investment required?

In 1919, Oregon came up with a solution: the state adopted a tax on gasoline, the proceeds of which were used in part for highway construction and maintenance in the state. The implicit bargain – later reflected in the adoption of a similar gas tax by every state – was that drivers, not taxpayers at large, would pay the costs of the highways they use. This same philosophy guided the dedication of the federal gas tax to the construction of the Interstate Highway System in 1956.

Drivers have never paid the full cost of roads, but for a time they did cover the lion's share of the cost of highway construction and repair, although even at the best of times only around 70% of the cost of highway construction, maintenance and operation nationwide was covered in this way.[25]

Since then, however, the transportation finance "bargain" has broken down. Driving-related fees pay for a lower share of the cost of highways than they did decades ago. And they cover none of the massive environmental, health and safety costs

that transportation imposes on all of us – many of which, such as costs related to the impact of global warming, would have been undreamed of by the initial architects of the nation's transportation finance system in the early 20th century.

FALLING GAS TAX REVENUES, MORE SPENDING

Today, motor fuel and vehicle taxes cover only around half of the cost of highway construction and maintenance nationally, and often less. The remainder comes primarily from general taxes paid by all taxpayers, including income, sales and property taxes and other levies. In 2019, only 43.5% ($112.19 billion) of total highway costs were covered by fuel and vehicle taxes. Toll revenues accounted for 8.95% ($23.10 billion) and bond issue proceeds and other investments 17.52%.[26] The rest – almost one-third ($80.31 billion) of the total – was paid for by property taxes, general fund appropriations and other taxes and fees.

In other words, we all bear the financial burden of driving, regardless of how much we drive, or whether we drive at all.

Recent years have seen a steady increase in the share of transportation costs paid by the general taxpayer. This is the result of increasing highway spending, coupled with decreasing gas tax revenue when adjusted for inflation.

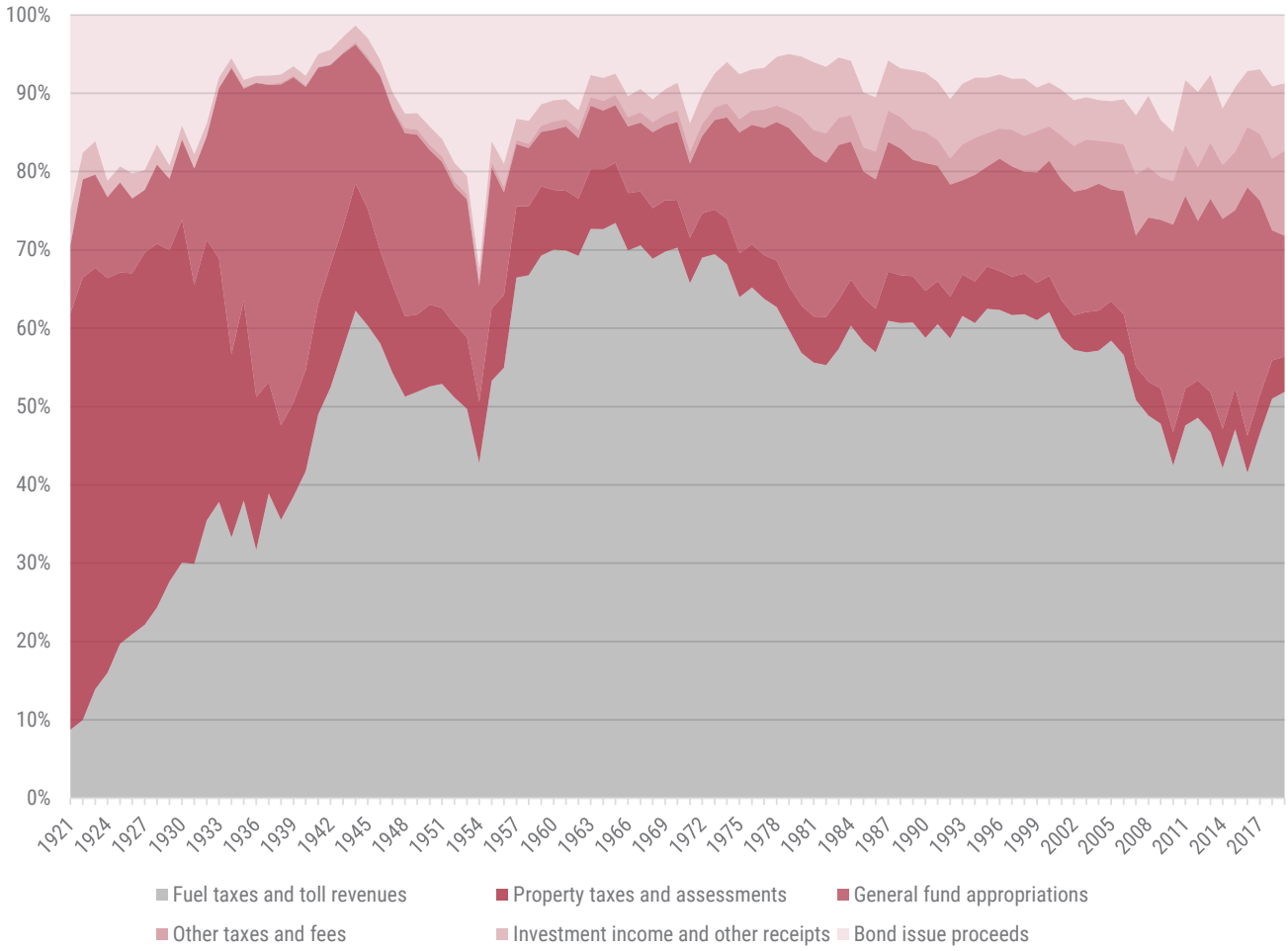

Figure 1: Sources of Highway Funding. Source: Federal Highway Administration, Highway Statistics series of reports, Table-HF 10

For much of the 20th century, occasional increases in fuel taxes, combined with consistent growth in vehicle miles travelled (VMT), helped to generate the funding needed for highway construction. Since the early 1990s, however, the federal gas tax has remained at 18.4 cents per gallon.[27] The decline in the purchasing power of gas taxes due to inflation, coupled with policymakers' desire to continue to increase overall transportation spending, has contributed to the decline in the percentage of transportation costs covered by user fees. Other factors, including the rising cost of construction and maintenance; decreasing fuel consumption as a result of improved vehicle fuel economy and more hybrid and electric vehicles on the roads; and the recent plateauing of driving, have also contributed.[28]

As gas tax revenues have stagnated, policymakers have been able to continue to increase spending on highways by tapping revenues from other taxes and, in the case of the federal government, increasing the deficit. Since 2008, for example, the federal Highway Trust Fund has been supplemented with congressional transfers of more than $153 billion of general revenues, and the bipartisan infrastructure framework passed in November 2021 will transfer a further $118 billion to the fund to keep it afloat for the next five years.[29] States such as Texas have also dedicated other government revenues – including revenue from oil and gas taxes and the state sales tax – toward transportation.[30]

Absent an increase in the gas tax, a reduction in transportation spending, or the creation of a new source of revenue (such as a VMT tax) the flow of general funds to the Highway Trust Fund will need to increase over the coming years if it is to remain solvent.[31]

TAXES ON DRIVING DON'T RECOUP ITS MASSIVE COST TO SOCIETY

The implicit bargain of America's transportation finance system is that driving will "pay its own way." Traditionally, that has been defined as covering the cost of building, maintaining and operating the roads. But it should also include recouping the massive environmental, health and other costs imposed by transportation on society.

When the current system of transportation finance was being developed, the environmental and societal costs of automobile use were never taken into account. Those costs – air pollution, noise pollution, greenhouse gas emissions, crash damages to non-drivers and property, and more – are now by any reasonable measure *greater* than the cost of road maintenance. Instead of being picked up by drivers themselves, however, they are shifted to others, including victims, taxpayers and the government. These costs include:

Motor vehicle crashes

Every year, on average, approximately 39,000 Americans are killed and millions more injured in vehicle crashes.[32] In 2018, nearly 6,300 pedestrians and more than 800 cyclists were killed in traffic-related accidents, and the National Highway Traffic Safety Administration reports that, in 2020, the total number of motor-vehicle-related deaths stood at 38,680.[33] The estimated financial cost of motor-vehicle deaths, injuries property damage and other financial impacts in 2020 totaled more than $474 billion.[34]

A more detailed breakdown published by the National Highway Traffic Safety Administration in 2015 calculated that in 2010, motor vehicle crashes imposed an estimated $292 billion in economic costs. These costs include lost productivity ($93 billion), medical costs ($28 billion), congestion-related

costs ($34 billion) and property damage ($92 billion), as well as legal and court costs, emergency service costs, insurance administration costs and others.[35] When "quality of life valuations" are taken into account, the total cost of societal harm from vehicle crashes in 2010 was just over $1 trillion.[36] Private insurers picked up a little over 50% of those costs, with the remainder divided among crash victims, third parties and government.[37] Roughly 7% of these costs were paid for out of the public purse at a cost of $21.75 billion to the general taxpayer, placing an additional tax burden of more than $188 on every U.S. household.[38]

Air pollution

Air pollution from road transportation emissions is responsible for at least 58,000 deaths in the U.S. each year, making transportation the largest single contributor to premature deaths from air pollution, and the most recent research suggests that this figure itself is likely a significant underestimate.[39] Pollutants in vehicle exhaust have been linked to heart, vascular and lung conditions, cancer, and a wide range of other illnesses.[40] A 2007 study estimated the annual cost of damage imposed by air pollutants nationwide (not including CO_2) to be between $71 billion and $277 billion in 2002, with cars, light-duty trucks and SUVs responsible for around 16% of those damages.[41] The air pollution-related damage attributable to driving, therefore can be estimated at $10.7 billion to $41.6 billion per year, an average of between $93 and $360 per U.S. household per year.[42]

Climate change

In 2018, transportation accounted for 28% of total U.S. greenhouse gas emissions – more than any other sector.[43] The U.S. Energy Information Administration estimates that in 2020, gasoline consumption from transportation resulted in the emission of around 948 million metric tons (MMT) of CO_2 and diesel consumption produced 428 MMT – together equating to roughly 84% of the sector's total CO_2 emissions.[45] In March 2021, the Biden administration released an estimated "social cost of carbon" of $51 per ton.[46] Applying that estimate to transportation emissions, the social cost of CO_2 emissions from gasoline consumption in the transportation sector would be $48.3 billion and diesel consumption $21.8 billion. Together these impose an annual burden of approximately $571 on every American household.[47] If gasoline and diesel were taxed at a rate that covered the cost of the damages imposed by the CO_2 emissions they produce, this alone would equate to a tax of at least $0.40 per gallon of gasoline and $0.49 on diesel.[48] If medical costs incurred by health impacts related to climate change were to be taken into account, that figure would be considerably higher.[49]

Noise pollution

The numerous, often serious health impacts of noise pollution created by road traffic are often overlooked. Exposure to road traffic noise can contribute to impaired mental health, insomnia, depression and anxiety, as well as increasing the risk of cardiometabolic diseases, cardiovascular diseases and strokes.[50] The estimated costs of traffic-related noise in terms of property values alone are in the region of 0.4-0.6 cents per VMT, but if taking into account healthcare and other costs, such as lost workplace productivity due to illness, this figure would be significantly higher.[51] Limited data exists on these costs in the U.S., but studies from Europe suggest that they are substantial. A 2011 report by the European Commission estimated the social cost of road traffic noise in the EU as EUR 36 billion ($57 billion) per year.[52] A 2014 Swedish study estimated the social cost of road traffic noise in Sweden at more than SEK 16 billion ($2.8 billion).[53]

Other costs

Other unpriced external costs of automobile use range from the costs of traffic congestion (one 2019 study found that the hours lost to traffic delays cost the U.S. economy a total of $179 billion every year) to the environmental costs of improper disposal of vehicles and parts, to water pollution from automobile components and road salt, to the military and geopolitical costs of oil dependency.[54] For example, a 2019 study found that of the 7 trillion pieces of microplastics that wash into San Francisco Bay each year, almost half the entire microparticle count were rubber particles likely from vehicle tires.[55] Road salt is similarly damaging, contaminating groundwater, rivers, streams, and potentially drinking water, and is thought to have been a factor in the water crisis in Flint, MI.[56]

Were the price we pay for using a car to cover these and the myriad other societal and environmental impacts of our car-dependent transportation system, it would be significantly higher than it currently is. Other developed nations generally charge far higher taxes on gasoline use (see Figure 2), an implicit recognition of the societal costs imposed by driving.

America spends too much money on the wrong transportation priorities

Our current system of transportation funding was designed to do a specific job: build roads. A century later, this job no longer needs doing. America has the world's largest road network.[58] The roads have been built, and transportation policy now operates within an entirely new context that brings with it an entirely new set of challenges – challenges which the current funding system is ill-equipped to meet.

Where once the nation stood on the cusp of an explosion in automobile use, current trends point in the opposite direction: Americans are leading increasingly multimodal lives, the younger generations seemingly no longer quite share their forebears' infatuation with driving or car ownership, and public opinion

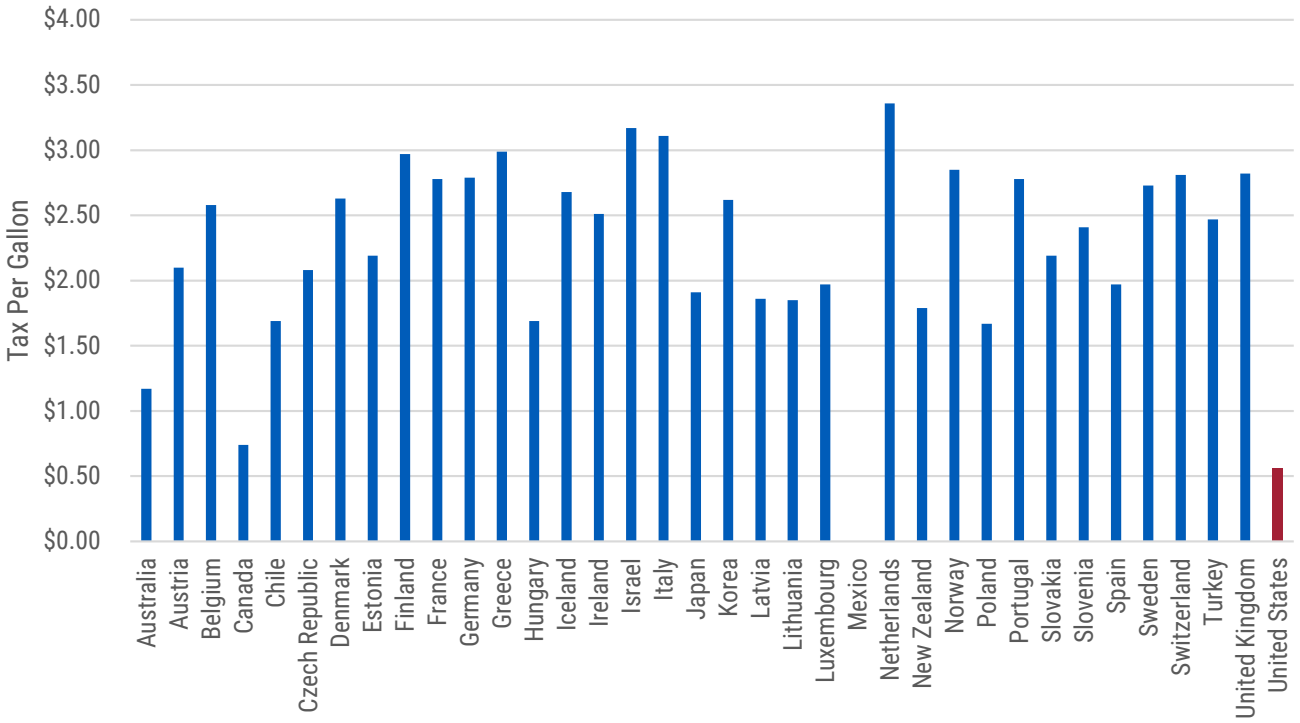

Figure 2: OECD Gas Excise Tax Rates (Per Gallon), 2017[57]

is leaning toward a desire for more and better transit rather than more and wider roads.[59] Where once the imperative was to create a system that maximized mobility by car, today, the priority must be to expand transportation choices and ensure that mobility doesn't come at the expense of our health, the environment and the global climate.

THE CURRENT TRANSPORTATION FINANCE SYSTEM PRIORITIZES HIGHWAYS AND UNDERFUNDS EVERYTHING ELSE

When America's current system of transportation finance took shape in the early 20th century, it was designed with a very specific purpose in mind: build (and later, maintain) roads.

The federal government has provided funds to support state construction of highways since 1916.[60] The federal Interstate Highway Program provided generous funds to states for the build-out of their networks of high-speed highways, with the federal government covering 90% of the cost of Interstate highways and the states 10%. Today, federal funding can be used to cover 80% or more of most federally supported highway projects.[61]

In many cases, these taxpayer dollars are today spent on unnecessary highway construction and expansion projects that are sometimes intended to address problems that do not exist, are doomed to fail in their stated objectives (road widening does not solve congestion, for example – in fact it makes it worse), and/or impose serious negative impacts on the communities around them.[62] These projects cost taxpayers billions of dollars to build and many more billions to maintain, saddling future generations with expensive maintenance needs.

Public transportation, on the other hand, was historically run by private entities operating under franchise agreements at the turn of the 20th century and remained so until the mid-century. The first direct federal funding for public transportation did not occur until 1961.[63] It was not until 1982 that Congress adopted the "80-20 split" in transportation spending as part of a deal to increase the gas tax, which has meant that highways receive approximately 80% of federal transportation dollars and transit 20%, which remains the case today. The federal cost share of new-build transit projects is significantly lower than the 80% match for highway projects, with recent rounds of federal capital grants for transit covering less than 40% of the project costs.[64]

At the state level, funding is often even more dramatically skewed toward highways. Many states have statutory or constitutional restrictions limiting the use of gas tax revenue to highways. In fiscal year 2019, only 13 states used revenue from the state gas tax for transit.[65] As a result, many states provide little or no direct funding for transit. Three states (Alabama, Hawaii and Nevada) report spending no state money on transit, while another six (Idaho, Kentucky, Mississippi, Missouri, New Hampshire and Ohio) spend less than $1 per person per year on state funding for public transportation.[66] Many other states provide only token funding, relying on federal funds and funds raised from local sources to pay for the costs of transit.

The result is that, in total, since the dawn of the Interstate Highway era in 1956, nearly nine of every 10 capital dollars spent on transportation have gone toward highways or aviation, leaving low-carbon transportation options such as transit, walking and cycling underfunded.[67]

Compared to the amount the public pays toward building and operating the highway system, both in taxes and fees and in additional indirect subsidies and unpriced external costs, investment of public money in other modes of travel is far lower.

In 2019, federal spending on highways totaled $46 billion.[69] By comparison, in 2018, federal funding for **transit** capital and operating expenditures totaled approximately $12.5 billion.[70] In 2018, Amtrak received federal

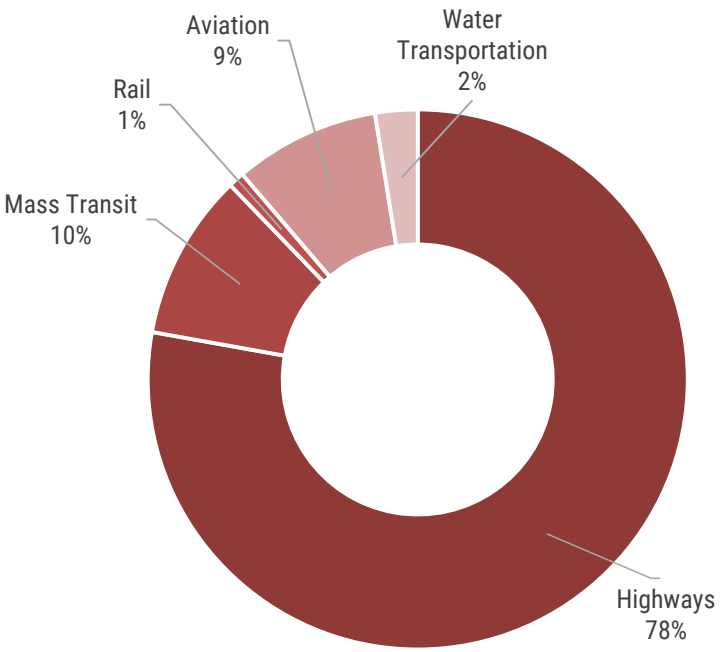

Figure 3: Government capital investment in transportation since 1956[68]

Source: Congressional Budget Office. Includes capital, operation and maintenance funding.

appropriations of around $1.9 billion to cover **passenger rail** operations in its national and Northeast networks, and, in 2020, federal funding for **walking, cycling and other active transportation** modes totaled a meager $850 million.[71] Even the limited federal funding provided for active transportation doesn't always get used for the purposes for which it is intended. By one analysis, in 2020, almost one-fifth of the funding apportioned to states and cities for walking and cycling infrastructure improvements through the Transportation Alternatives program was reallocated to other projects, including those that benefit automobile users.[72] **Transportation demand management (TDM)** programs – often the most cost-effective solution to transportation problems – tend to receive even less funding.[73]

TOO MUCH MONEY IS SPENT ON NEW PROJECTS AND NOT ENOUGH ON REPAIRING WHAT WE ALREADY HAVE

Over the course of the 20th century, America built out the world's most extensive network of highways, but much of this infrastructure is now aging and in dire need of repair. Currently, 173,000 miles of road and more than 45,000 bridges across the country are classified as being in "poor" condition.[74] As of 2017, 11 states had at least 30% of their roads in poor condition, and this percentage has risen over recent years.[75] From 2009 to 2017, 37 states saw an increase in the percentage of roads in poor condition, and the total percentage nationwide rose from 14% to 20%.[76] Over the last decade, the number of vehicle miles traveled on roads in poor condition has risen from 15% to more than 17%.[77]

America's transportation infrastructure repair backlog currently totals more than half a trillion dollars, including $435 billion needed for road repair and $125 billion for bridge repair.[78] By one estimate, as of 2017, keeping our existing road network in acceptable repair and fixing the backlog of roads in poor condition alone would require $231.4 billion annually over a six-year period.[79] In addition, the U.S. Department of Transportation estimates a backlog of over $105 billion for transit infrastructure in need of replacement.[80] Passenger rail infrastructure, too, is in need of repair. Amtrak reports a $45.2 billion repair backlog in the Northeast alone.[81] Yet even as these repair needs pile up, states continue to pour billions of taxpayer dollars into new and expanded roads and other wasteful infrastructure projects.

There is currently no requirement that states receiving federal funds must direct them toward repair and rehabilitation of existing infrastructure rather than the construction of new and wider highways. In fact, states spend roughly the same amount on building new and wider roads as they do on fixing existing ones.[82] Between 2009 and 2014, states spent on average $21.4 billion annually on road repair and $21.3 billion annually on road expansion.[83] Over that time, spending on road repair accounted for 30% of states' total capital spending on highways, and road expansion 29%.[84] In addi-

tion to diverting funds away from repair and maintenance, as well as from transit and other non-auto modes of transportation, every dollar spent on road construction and expansion adds to the burden of maintaining highways in the future. A single new lane-mile of road costs around $24,000 annually to maintain.[85] Between 2009 and 2017, the U.S. public road network grew by almost a quarter of a million lane miles.[86] Maintaining those new roads alone will therefore require spending roughly an additional $5.4 billion per year.[87]

Our system of pricing transportation encourages damaging behavior and discourages healthy and sustainable choices

Public discussion around transportation finance often focuses exclusively on how to raise and spend the funds needed to build and maintain transportation infrastructure. That discussion leaves out an important element: how the allocation of the costs of transportation affects people's daily choices.

By failing to ensure that transportation users pay – in taxes, fees and prices – for the full cost of their impact on transportation infrastructure, society and the environment, America subsidizes the most dangerous, damaging and polluting forms of transportation, thereby encouraging their use. At the same time, fare policies for public transportation often create hurdles to transit use. Indeed, it is cheaper to drive to and park at many locations around the country – even in major cities – than it is to take transit there.

To address the health, environmental and other impacts of the current system, the way we price and the way we spend need to work together to ensure that the most societally beneficial modes of transportation are also the most affordable, convenient and attractive ones. To achieve that goal, our system of pricing transportation must change.

THE CURRENT FUNDING MODEL INCENTIVIZES THE MOST SOCIETALLY DAMAGING MODES OF TRAVEL

Through a variety of benefits, both indirect and direct, the U.S. government heavily subsidizes automobile travel. A 2008 study estimated the total value of tax subsidies to U.S. motorists as between $25 billion and $83 billion per year, equivalent to $210 to $708 per U.S. household.[88] These subsidies have the net effect of artificially bringing down the cost of automobile travel, often making driving the cheapest, and therefore most attractive, mode of transport. Research shows that this heavy subsidization is an important factor underlying high levels of driving in the U.S. A 2011 study comparing U.S. and German residents found that Americans are more likely to drive because U.S. subsidies encourage and incentivize driving even in places where walking, biking or transit are available.[89]

Most subsidies for driving come in the form of the myriad unpriced external costs of automobile travel (global warming, air pollution and so on) for which government and society pick up the tab. But the government also directly subsidizes driving in a variety of ways. These include:

State sales tax exemptions on gasoline. Fuel is exempt from general sales tax in many states, representing a form of underpricing relative to other goods.[90] For example, in states where gasoline purchases are exempted from the general sales tax applied to purchases of most other goods, an individual buying, say, cycling equipment costing $80 might pay a 7% general sales tax on that purchase, thus contributing $5.60 to the state's general fund. An individual paying $80 to fill the 32-gallon gas tank of a Hummer, on the other hand, might pay an 18 cents-per-gallon state gas tax, contributing $5.76 to a fund allocated largely or entirely to roads. If gasoline is exempted from the general state sales tax, however, the Hummer driver effectively

receives a $5.60 tax *break* that more or less cancels out the additional contribution that driver makes to state revenue.[91]

- **Income tax exclusion for commuter parking benefits.** Current tax policies make subsidized parking an attractive employee benefit.[92] Every year the U.S. government spends more than $7 billion to encourage people to drive to work through the federal income tax exclusion for employer-provided and employer-paid commuter parking.[93]

- **Corporate income tax and other subsidies for the fossil fuel industry.** Federal and state subsidies for fossil fuel companies contribute to artificially low fuel prices.[94] According to a 2017 report, in 2015 and 2016 federal and state governments gave away an average of $20.5 billion per year in production subsidies to the oil, gas and coal industries, including $14.7 billion in federal subsidies and $5.8 billion in the form of state-level incentives.[95] For example, the Corporate Tax Exemption for Fossil Fuel Master Limited Partnerships (MLPs) enables companies to avoid paying corporate income tax. In 2015-2016, this subsidy totaled on average $1.61 billion.[96] The rise of the MLP structure over recent years has primarily served the interests of the oil and gas industry, with fossil fuel companies accounting for 70% of market capitalization of MLPs in 2016.[97]

THE TRANSPORTATION FINANCE SYSTEM DISINCENTIVIZES MODES OF TRAVEL THAT SHOULD BE ENCOURAGED

To encourage people to make the most societally beneficial transportation choices, these choices need to be the cheapest, most convenient and most pleasant of all the available alternatives. Often, the current system ensures that they are none of these things. In many places, for example, it may be cheaper to commute to work by car and find a place to park than to hop on a bus. In states with large fees for electric vehicles, it may be less tax-intensive to drive a gasoline vehicle than an EV. Despite a widespread recognition of the environmental and public health imperatives of reducing automobile use, such contradictions built into the current system of transportation finance have the net effect of ensuring that the automobile is often still the most attractive option.

Penalizing electric vehicles

One such contradiction lies in states' responses to the rise of electric vehicles. The fact that EVs don't run on gasoline means that EV users do not pay the gas taxes that are often devoted to roadway maintenance. This has led to concerns in some states that the rise of EVs will exacerbate the growing transportation funding shortfall.[98] For this reason, states have begun to experiment with fees on EVs, including registration fees and road usage charges.[99] A charge on EVs to cover their share of maintaining the roads may not in itself be unjustifiable, but it is *not* justifiable if, at the same time, drivers of gasoline-powered vehicles are escaping being charged for their share of polluting the air, contributing to climate emissions, and the various other environmental and health impacts of fossil fuel vehicles.

In Georgia, for example, EV owners pay $213.70 per year as a license fee to own an electric vehicle.[100] The average Georgian drives 12,828 miles per year. If all those miles were driven in an EV, that would represent a fee of $0.017 per mile.[101] Georgia collects a gas tax of 28.7 cents per gallon, which (assuming an average fuel economy of 25 MPG), equates to $0.011 per mile for drivers of polluting, fossil fueled vehicles.[102]

Making transit more expensive than driving

A similar problem occurs with public transportation. The expectation that transit should cover a large share of its own costs through passenger fares leads transit agencies to respond to declines in ridership by raising fares or decreasing service, rather than lowering fares and expanding service to entice

riders back. Given limited state spending on transit and limitations on the ability to use federal funding for operating expenses, many agencies simply have no other choice. Even though the social costs of a bus commute are considerably lower than those of the same commute taken by car, the price of a bus fare is likely to be significantly more than what that same trip would cost if taken by car. Since 1990, the cost of an average transit trip has increased by 143%.[103]

Encouraging large vehicles over small ones

The cost of driving currently does not reflect the relative costs in highway infrastructure expenses, pollution and climate impacts incurred by different vehicle types. A 2019 analysis, for example, found that SUVs were the second largest contributor to the increase in global CO_2 emissions from 2010 to 2018, second only to the power sector.[105] In terms of road damage, too, the heavier the vehicle, the more road wear it causes. As a general rule, the damage a vehicle imposes on a road surface increases to the fourth power of axle weight – so a vehicle that weighs 10 times as much per axle imposes 10,000 times as much roadway damage as a lighter vehicle.[106] However, a 2000 addendum to the last major Federal highway cost allocation study (conducted in 1997) found that under the spending structure and tax rates in use at the time, the heaviest vehicles on average pay 80% of their federal highway cost responsibility through user fees, and vehicles over 80,000 lbs. pay only half of their cost responsibility.[107] This inequitable user fee structure means that since larger vehicles pay less than their share of cost responsibility, lighter ones therefore pay more than their share, thus effectively subsidizing the operations of larger vehicles. This is another way that the current "user fee" system incentivizes larger and more damaging vehicles, such as SUVs and heavy trucks, over smaller ones.

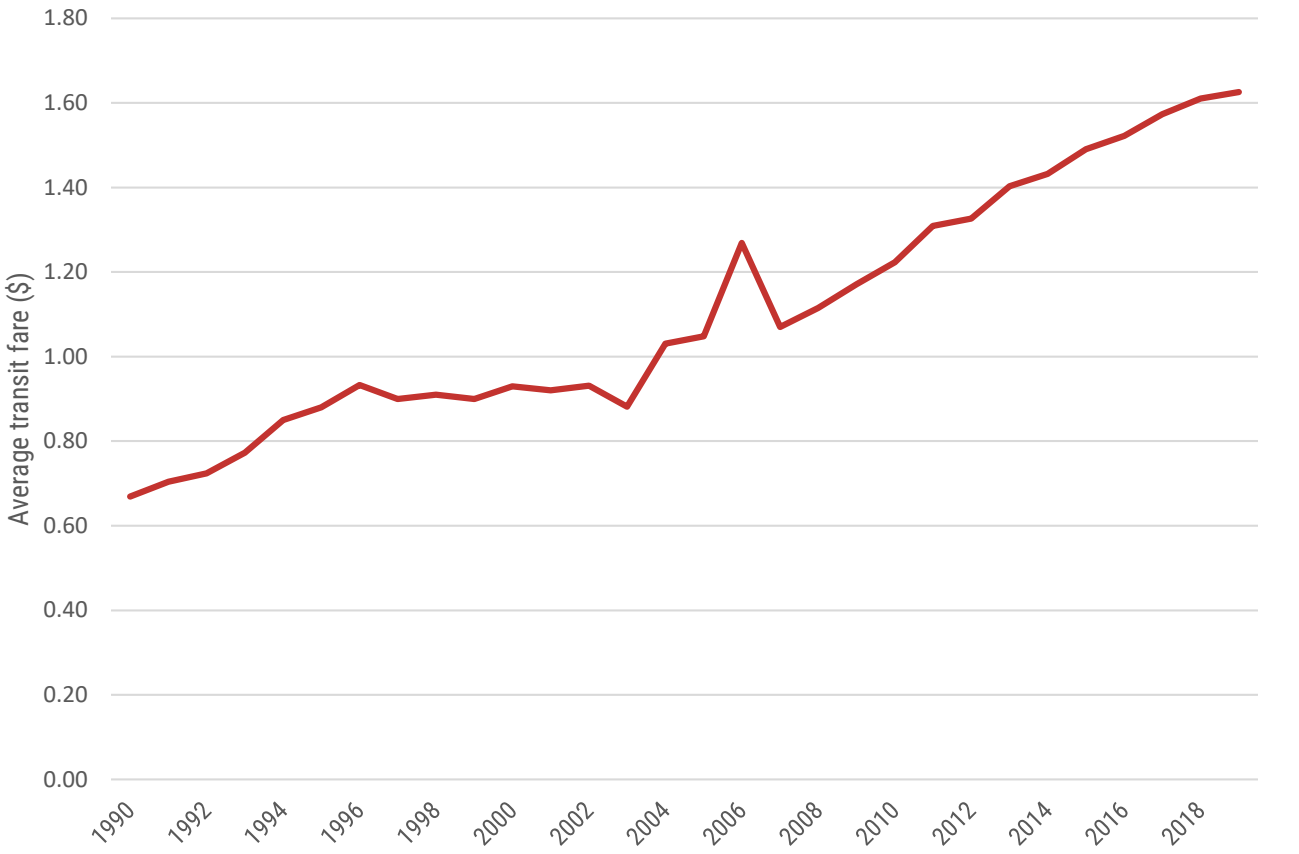

Figure 4: Average Transit Passenger Fares since 1990 (current dollars)[104]

OUR TRANSPORTATION FINANCE SYSTEM HURTS THE WORST-OFF

America's transportation finance system – both the ways in which transportation is paid for and how the money is spent – hurts all of society, but particularly those who are least well-off. Lower-income communities shoulder a disproportionate share of the health and environmental costs of an auto-centric transportation system. And the nation's failure to provide affordable public transportation and safe infrastructure for low-cost forms of transportation such as biking and walking leaves many low-income households with little choice but to undertake the financial burden of owning and maintaining a personal vehicle.

Specifically, our transportation system:

- Disproportionately exposes low-income communities and communities of color to traffic-related air pollution – in large part since the historical legacy of discriminatory housing and zoning policies means that these communities tend to be located in closer proximity to highways – despite these groups generally having lower rates of car ownership and driving less themselves.[108]
- Ensures that the heaviest financial burden for transportation falls on the least well-off. In 2020, households in the bottom fifth of the country by income spent a significantly greater proportion of their income on transportation than those in the top fifth (28.8% and 9.5% of total after-tax income, respectively), despite owning fewer cars on average (1.0 and 2.7 cars per household, respectively).[109]
- Puts minority and low-income communities at greater risk of traffic-related death and injury. A 2020 analysis of pedestrian fatalities between 2015 and 2019 found that Black, Indigenous and People of Color (BIPOC) accounted for a disproportionately large percentage of pedestrian fatalities, with African Americans, for instance, accounting for 21% of all traffic related pedestrian fatalities despite accounting for only 12% of the population.[110] Similarly, a study in Southern California found that the percentage of the population of a given area living in low-income households was the strongest predictor of pedestrian injuries in that area,[111] with pedestrian crashes four times more frequent in low-income neighborhoods.[112]

In addition, low-income people benefit less from the nation's underpricing of driving and parking. In 2020, 28% of households in the bottom fifth of the country by income owned no cars at all, compared to only 3% of households in the highest income category.[113]

A transportation funding system that prioritizes spending on the most societally beneficial modes and projects, and that charges users based on their true societal impacts will tend to benefit those – including many low-income people – who travel via low-impact forms of transportation such as transit, biking, walking and carpooling, while expanding the number of people who can integrate sustainable modes of transportation into their daily lives. For some households, however, the increase in the cost-per-mile of driving may create economic hardship. Policymakers should consider and look to address those hardships in the design and implementation of a new transportation system.

A new paradigm for transportation finance

THE CURRENT SYSTEM of transportation financing was designed a century ago to address a specific problem: building a robust road network. And it did. Yet the same outmoded financing system remains, while the transportation challenges the U.S. faces today are radically different from those of the early 20th century.

America needs a new approach to taxing and paying for transportation appropriate to meet the transportation needs of the 21st century. That approach should be based on two core principles: ensure that the cost of different modes of transportation reflects their true impact on society, and prioritize transportation spending based on its societal benefits.

Ensure that the cost of different modes of transportation reflects their true impact on society

Transportation fees should reflect the overall cost to society

The cost of every trip should ideally reflect the cost it imposes on others and its impact on existing infrastructure. In environmental economics, the "polluter pays" principle holds that those who engage in behavior that inflicts damage on society should pay for the costs of that behavior. This both ensures fairness and, more importantly, discourages polluting activities – making everyone in society better off.

"Entertainments may be taxed; public houses may be taxed; racehorses may be taxed … and the yield devoted to the general revenue. But motorists are to be privileged for all time to have the whole yield of the tax on motors devoted to roads. Obviously this is all nonsense. … Such contentions are absurd."

– Winston Churchill, 1925

Everyone who takes any mode of transport necessarily imposes costs on society – including in the form of road wear, congestion, air and water pollution, and contribution to global warming.

Yet the costs associated with these impacts are currently not reflected in the prices we pay for these various modes of transportation. This means that decisions as to what form of transport to take for any given trip (Should I drive or take the bus? Should I drive a car or an SUV? Should I drive a gas-powered car or an EV?) often wind up with the most societally damaging modes of transport being the cheapest of all available options.

The table below includes some of the costs imposed by various modes of transportation, with a general estimate of the magnitude of the cost. A mile traveled in a heavy-duty truck, for example, imposes vastly more societal damage across nearly every metric than a trip on a bicycle. Trips in gasoline and electric vehicles impose similar impacts in some categories (e.g., road space consumption and crash damage) but not in others (climate and air emissions and noise pollution).

Transit trips may seem expensive when the total cost of providing transit is divided among those who ride. However, the *marginal cost* of any individual transit trip is typically very low. If a bus is already running, the impact on society or the transportation system from any individual person getting on that bus is miniscule (unless it creates crowding that requires the transit agency to undertake the cost of adding more service), whereas the cost imposed on society by a marginal car trip is high. Therefore, it makes sense to society for the price of transit trips to be far lower than the cost of a car trip in order to encourage transit use.

Making the costs of different modes of transport commensurate with their true societal cost can be a crucial tool for reducing the environmental and health impacts of our transportation system. Shifting our approach to transportation finance away from "user fees" and thinking instead in terms of "impact fees" can bring the financial cost of driving closer to reflecting its true costs, helping to ensure that the price people pay for automobile use corresponds to the damage it causes, while incentivizing transportation choices that deliver the greatest benefits to or impose the lowest costs on society. Such policies should ensure that the mode with the lowest societal impact is always the cheapest.

Such policies include:

- **Congestion pricing:** Congestion pricing is a form of tolling that takes a market-based approach to managing congestion, often with charges that vary by time of day or traffic level. Studies suggest that a time-variable fee that makes it more expensive to travel during peak hours may prompt drivers to shift travel times, travel by a different mode (e.g., transit) and/or reduce the total number of trips they make.[114] For instance, after it was first implemented in 2003, the London congestion charge, whereby motorists pay a fee to drive in central London on

TABLE 1. SOCIETAL COSTS IMPOSED BY VARIOUS MODES OF TRAVEL

	Road wear	Road space consumption	Climate impacts	Air pollution	Noise pollution	Crash damage	Total cost
Heavy-duty diesel truck	******	******	******	******	******	******	$$$$$$$
Gas-powered SUV	*****	****	*****	****	*****	*****	$$$$$$
Gas-powered car	****	***	****	***	****	****	$$$$
Electric SUV	*****	****	*	*	*	*****	$$$
Electric car	****	***	*	*	*	****	$$
Marginal transit trip	*	*	*	*	*	*	$
Bicycle	-	*	-	-	-	-	-
Walk	-	-	-	-	-	-	-

weekdays, reduced private automobile traffic in the city by 38% and total vehicle traffic by 18%.[115] Particularly when paired with expanded transit service, congestion pricing has proven to be an effective policy for increasing transit ridership.[116]

- **VMT taxes:** Many of the costs imposed by using a roadway, including road wear and tear, crashes, congestion and noise, are more closely linked to the number of vehicle-miles traveled than to the quantity of fuel consumed.[117] A VMT tax – i.e., charging drivers based on their actual road use and thus providing pricing incentives to drive less – may therefore be an effective way of recapturing some of the costs imposed by driving. A 2020 study by the Tax Foundation estimates that to cover the highway fund's expenditures, a federal VMT tax rate would need to average 1.7 cents per mile, with the exact rate per vehicle differentiated based on weight.[118] A further advantage to VMT fees is their transparency. Having fees for each vehicle available to view in real time has been shown to influence people's transportation decisions. Oregon's VMT fee pilot project, for example, wherein users were charged a fee according to the number of miles they drove, resulted in a 12% decrease in vehicle miles traveled among participating vehicles.[119]

- **Carbon fees:** Since a vehicle's carbon emissions are proportional to the amount of fuel that vehicle consumes, one way of ensuring that the cost of driving comes closer to incorporating the full cost of these emissions is through an additional tax on fuel – i.e., a carbon tax. To an extent, this is what the gas tax does, but the current gas tax doesn't even come close to covering the costs associ-ated with vehicles' carbon emissions. If gasoline were taxed at a rate consistent with a $51 per ton "social cost of carbon," this *alone* would equate to a tax of at least $0.40 per gallon – and this does not take into account, for example, medical costs associated with climate change-related health impacts.[120] A study from the University of Ottawa estimated that the carbon tax implemented by British Columbia at a rate of $10 per ton of CO_2 in 2008 reduced gasoline demand by more than 12% by the time it had been increased to $25 per ton some years later.[121] Over its first four years, the study found, the tax was associated with a reduction in gasoline emissions of more than 3.5 million tons of CO_2.[122]

- **Emission fees:** Fees that incorporate the costs of environmental pollution into the cost of driving give drivers the incentive to reduce emissions, for example by minimizing mileage in higher-emission vehicles or choosing low-emission vehicles. Air pollution costs are highly variable depending on vehicle type and location, but are estimated to range from around $0.05 per vehicle-mile for a low-emission vehicle driving in a rural area to upwards of $0.10 per mile for higher-emission vehicles driven in, for example, an urban center.[123] Noise imposes costs, too, which vary widely depending on vehicle type, time and location, but are estimated to average 0.2-2 cents per vehicle-mile.[124] Emission fees can be rolled into other charges – such as carbon fees, gasoline taxes, or VMT fees – to increase simplicity.

- **Weight- or size-based fees:** Since heavy vehicles do more damage than light ones – both to roads themselves, and to the environment in the form of higher emissions – one logical way of ensuring that drivers contribute fairly to covering the costs they impose on others while at the same time disincentivizing purchases of heavier, usually more fuel-inefficient vehicles, is by instituting fees based on the actual damage that vehicles cause.[125]

Weight-distance fees (calculated from vehicle weight times mileage), for example, may more accurately reflect road costs than fuel taxes, especially for large trucks, and thus be a more appropriate way of paying for them. Weight- and size-based fees can also be assessed at the time of vehicle purchasing and registration. Mandating higher insurance rates for heavier vehicles may also act as a disincentive to purchase such vehicles.

- **Raising the gas tax:** With the federal gas tax at 18.4 cents per gallon and the average state fuel tax at 30 cents, U.S. gasoline taxes currently average around $0.48 per gallon.[126] A 2021 analysis by the Victoria Transport Policy Institute argues that in order to compensate for production externalities (including environmental damages and tax subsidies), importation costs and climate change emission costs, fuel taxes would need to average up to $1.00 per gallon, or 5 cents per vehicle mile.[127] This figure is itself an extremely conservative estimate since it assumes that roadway and other pollution costs are covered by other charges, such as emission fees and weight-distance fees.[128]
- **Reducing transit fares:** Every day in the United States, buses and trains travel around our cities with empty seats even as the cost of a transit fare might lead someone to drive instead. In order to be competitive with driving, and to make the best use of our investments in transit capacity and operations, transit agencies should experiment with reducing fares, particularly at times of low ridership. Reduced off-peak fares, weekend discounts, free fares for some lines, youth discounts, low-income fare programs and other discounts can help to make best use of our transit capacity, while reducing the reliance of transit agencies on fare revenue would bring the added benefit of enabling them greater flexibility in meeting growing demand for public transportation.
- **Cutting EV fees:** While drivers of gasoline-powered vehicles continue to escape being charged for their share of polluting the air, contributing to climate emissions and the various other environmental and health impacts of fossil fuel vehicles, there is no justification for charging drivers of zero-emission vehicles a fee for EV ownership. Until such time as gasoline and other fuel taxes increase to better approximate their true impacts, governments should avoid adopting EV fees that could slow adoption of cleaner vehicles.

Changing transportation fees can be implemented in one of two ways. The first is to assess fees and set prices that incorporate the costs of multiple impacts in a single fee. The gas tax is an example of this, being a rough proxy for climate, air pollution and roadway impacts – albeit one that currently falls well short of covering the full cost of these and the myriad other impacts of automobile use. Registration fees and VMT taxes based on vehicle size/weight/fuel type are other examples. Alternatively, each externality of automobile use can be priced separately, i.e., with a congestion charge, a VMT tax, a carbon tax and so on.

However they are implemented, the relative cost of each mode should reflect the cost it imposes on society and the environment. If gas taxes were to be increased so as to ensure they cover the damage caused by driving, including wear and tear on the roads they use, then it may make sense to make EV drivers contribute financially for their part in covering these costs, but until that time, EV fees likely do not make sense. The modes of transportation that cause the least damage of all – biking and walking – should be those receiving the most generous subsidies.

Walking and cycling impose virtually no impacts on the transportation system, or on the environment or public health (in fact,

they have a net positive effect on health). Compared with cars and trucks, pedestrians and bicyclists impose little wear and tear on road surfaces and take up a tiny fraction of the space of motor vehicles. A general rule of thumb is that the damage a vehicle imposes on a road surface increases to the fourth power of axle weight – that is, a vehicle that weighs 10 times as much per axle imposes 10,000 times as much roadway damage as a lighter vehicle.[129] A 200-pound bicyclist with a 50-pound bike, therefore, will impose approximately 1/65,000th the roadway damage of a 4,000-pound car. Cyclists and pedestrians also take up little space on roads. A stationary pedestrian takes up one-80th of the space of a parked vehicle, and a bicycle one-20th of the space. Compared with a vehicle traveling 60 miles per hour, a pedestrian takes up one-250th of the space, a bicyclist one-100th of the space, and a bus passenger one-67th of the space.[130]

Estimates of the external costs imposed by walking and biking validate the conclusion that it is inappropriate to charge bicyclists and pedestrians "user fees." A 2009 analysis by the Victoria Transport Policy Institute estimated that the external cost of a mile of bicycling was less than a penny, while the cost imposed by a mile of walking was 0.2 cents – compared with external costs of driving of more than 29 cents per mile.[131] In sum, bicyclists and pedestrians already pay for most of the infrastructure they use through general taxes. Those who bike and walk likely provide far more value to motorists through general tax-funded local streets and roads devoted to cars than drivers provide in return through gas tax-funded pedestrian and bicycle projects. Even if people who bike and walk were to be charged fees based on the impacts of their behavior – something that has never been fully required of drivers – those fees would likely be so small as to be barely worth collecting.

Spend money where it makes sense.

Transportation spending should be prioritized based on what investments will deliver the greatest societal benefits.

The need for substantial expenditure on transportation is very real. In addition to maintaining and repairing the country's existing road, rail and transit infrastructure, we need to retrofit that infrastructure to withstand the impacts of climate change, expand low-carbon and sustainable transportation options, invest in electrifying our transit fleets and in electric vehicle charging infrastructure, and so on. These are the transportation priorities of the 21st century, and it is in these areas that transportation spending should be focused. A system of funding that instead channels billions of taxpayer dollars into building more roads, incentivizes the most environmentally and societally damaging modes of travel, and limits the ability of local, state and federal authorities to act on the actual problems of the day, is a broken one.

A major part of the reason why the current system lends itself so readily to wildly misplaced priorities and wasteful spending lies in the enduring power of the myth of the "user fee." Thinking of gas taxes as "user fees" rather than conventional taxes creates the assumption that revenues from these taxes should be spent solely on automobile infrastructure – hence the widely-held belief that taxes on drivers should be seen primarily as a way of raising money for transportation. This belief may have made sense when building the nation's road network was a national priority and most of the funds used to do so did indeed come from levies on drivers. It does not make sense now.

Indeed, there is no inherent reason why taxes on driving must be used solely for the benefit of drivers. A tax on gasoline

is a tax like any other, and to ringfence revenues from that tax for use exclusively on roads is to prevent them being spent on anything else – even when they could be put to more socially beneficial uses. As Winston Churchill said in opposing the United Kingdom's "road tax," if other forms of consumption may be taxed and "the yield devoted to the general revenue," the idea that "motorists are to be privileged for all time to have the whole yield of the tax on motors devoted to roads" is absurd.[132]

Just as there is no reason why these taxes should not be spent on addressing other transportation priorities besides roads, there is likewise no inherent reason why they should even be dedicated to the transportation sector at all. Indeed, gas taxes have historically been used for a range of other purposes, including to pay for deficit reduction and education, as well as to contribute to states' general funds. While often regarded as "diversions," these uses of gas tax revenues are perfectly legitimate.

Given the immense harm that fossil fuel consumption inflicts on public health and the environment, the priorities of 21st century transportation policy would be well served by taxing gasoline and diesel at a level that recoups the value of that harm and by ensuring that the revenues the tax brings in can be used in ways that deliver the greatest social benefit. Breaking down outdated divisions of gas tax revenue that are not based on actual need – for example, by putting the majority of revenues generated from transportation taxes into general funds, as is the norm in many other countries – can help to achieve that goal.

Breaking the link between the sources of transportation revenue and the ways in which it is spent would bring the United States into closer alignment with transportation funding practices in the rest of the developed world. As well as having an uncommonly low gas tax, the U.S. is unusual among developed nations in hypothecating fuel taxes exclusively for transportation uses. A 2014 Eno Center for Transportation review of policies in five "peer nations" found that, at that time, all funded transportation infrastructure investment out of general revenues rather than through a dedicated, gas tax-funded "trust fund."[133] For example:

- Drivers in the **United Kingdom** pay relatively high fuel taxes, including a percentage-based, value-added tax and an excise tax, which in 2014 totaled roughly £3.03 (U.S. $5.15) per gallon.[134] However, these "user fees" are not ringfenced for transportation, but instead deposited into the UK's Consolidated (general) Fund from which transportation funds are appropriated every three years through the UK's budgeting process to the Department for Transport (DfT). In 2011, total UK public sector spending on transportation amounted to only 72% of total fuel tax revenues (and less than a third of fuel tax revenue was spent on roads), the remainder staying in the general fund for use on non-transport-related projects.[135]

- In **Germany**, which has a similar federal structure to the U.S., the federal government is responsible for planning and funding federal road and rail infrastructure, but responsibility for building and operating transport infrastructure largely falls to the states. However, transportation funding comes from general taxation, and the states' transportation funding in large part comes out of the federal coffers.[136] As in the U.K., gasoline is taxed at a significantly higher level in Germany than the U.S. (EUR 0.67 per liter [U.S. $3.43/gallon] as of 2014), generating roughly EUR 18 billion (U.S. $24.5 billion) for the federal government each year. While this is more than Germany's total

annual federal spending on transportation infrastructure, gas tax revenues are not ringfenced for transportation.[137]

- In **Australia**, similarly, funding for surface transportation programs is appropriated from general taxation. As of 2014, the country's gas tax stood at AU $0.38 per liter (U.S. $1.29/gal) and generated around AU $15 billion (U.S. $14 billion) annually in federal revenues. These revenues are deposited into the Consolidated Revenue Fund. Most large-scale capital projects in the transportation sector are funded directly through parliamentary appropriation based on the government's five-year plan, drawn up on the basis of economic analysis by the independent statutory body Infrastructure Australia, which creates a "National Priority List" of infrastructure projects deemed to offer the greatest economic benefits to the country.[138]

Bringing the U.S. into line with other developed nations and creating a transportation finance system commensurate with the challenges of the 21st century means increasing charges on driving, abolishing trust funds (other than for maintenance of existing infrastructure), and putting the majority of taxes and fees levied on transportation into funds that can be allocated on the basis of societal need. Examples from abroad indicate that pricing the full societal cost of transportation and depositing the proceeds of fuel taxes in the general fund would likely not just comfortably cover the nation's transportation infrastructure needs, but bring in substantial revenue to invest elsewhere.

As is the case with any other tax revenues, spending decisions should be prioritized on the basis of the benefits they can deliver to society, and transportation expansion projects should compete with each other, and with other societal priorities, on this basis. This will necessitate the formulation of clear goals to guide transportation investments, including goals to reduce air, water and climate pollution, reduce crashes and deaths, expand transportation options and access, and support thriving, healthy communities.

Conclusion

THE OBJECTIVES for which our current system of transportation finance was designed have long since been met. Continuing to allocate transportation funding as though building more roads were the country's main transportation priority is preventing us from addressing the real transportation needs of the 21st century: keeping our existing road network in good repair; reducing air pollution, climate emissions and traffic fatalities; and making sure all Americans have access to sustainable transportation options.

The policymakers who designed our current system of transportation finance in the early years of the 20th century designed a system geared toward the needs of their time. Today, in the early 21st century, it is time for policymakers to do the same.

Notes

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116. Federal Highway Administration, *Congestion Pricing: A Primer*, December 2006, available at https://ops.fhwa.dot.gov/publications/congestionpricing/index.htm; Federal Highway Administration, *Benefits of Congestion Pricing*, archived 6 April 2019 at http://web.archive.org/web/20190406141452/https://ops.fhwa.dot.gov/congestionpricing/cp_benefits.htm.

117. Congressional Budget Office, *Alternative Approaches to Funding Highways*, March 2011, cited in Anastasia Christman, *You Get What You Pay For: User Fees and the Financing of U.S. Transportation Infrastructure*, National Employment Project briefing paper, November 2013, archived at https://web.archive.org/web/20210519215231/http://stage.nelp.org/wp-content/uploads/2015/03/Report-Financing-Transportation-Infrastructure-User-Fees.pdf, p.8.

118. Ulrik Boesen, "Who will pay for the roads?" Tax Foundation, 25 August 2020, archived at http://web.archive.org/web/20210503233309/https://taxfoundation.org/road-funding-vehicle-miles-traveled-tax/.

119. Robert D. Atkinson, Information Technology and Innovation Foundation, *A Policymaker's Guide to Road User Charges*, 22 April 2019, archived at http://web.archive.org/web/20210512142655/https://itif.org/publications/2019/04/22/policymakers-guide-road-user-charges.

120. In 2020, 123.73 billion gallons of motor gasoline were consumed in the U.S. transportation sector (see note 8). Gasoline tax necessary to cover the social cost of carbon: $48.3 billion total social cost of carbon ÷ 123.73 billion gallons of gasoline consumed = $0.40 per gallon.

121. Cited in Jonathan Marshall, "Impervious to a carbon price? The myth of transportation and carbon fees," Citizens' Climate Lobby, 26 September 2019, archived at https://web.archive.org/web/20210520054445/https://citizensclimatelobby.org/impervious-to-a-carbon-price-the-myth-of-transportation-and-carbon-fees/.

122. Ibid.

123. Todd Litman, Victoria Transport Policy Institute, *Socially Optimal Transport Prices and Markets Principles, Strategies and Impacts*, 22 April 2021, archived at http://web.archive.org/web/20210427121901/https://www.vtpi.org/sotpm.pdf, p.29.

124. Ibid.

125. Ibid., p.25.

126. Average of state + federal gas taxes = $0.4856: U.S. Energy Information Administration, *Federal and State Motor Fuels Taxes*, updated February 2021, revised May 2021, downloadable from https://web.archive.org/web/20210519210104/https://www.eia.gov/tools/faqs/faq.php?id=10.

127. See note 123, p.30.

128. Ibid.

129. Samer Madanat and Shadi Anani, *Repricing Highway Pavement Deterioration*, University of California Transportation Center, 2010, accessed 23 December 2021 at https://escholarship.org/uc/item/65c401fx.

130. Vehicles in motion occupy more space as they require buffer zones ahead of and behind the vehicle to allow safe following distances. Victoria Transport Policy Institute, "Road space reallocation," in *TDM Encyclopedia*, updated 4 June 2014, accessed 8 March 2015 at www.vtpi.org/tdm/tdm56.htm.

131. Todd Litman, Victoria Transport Policy Institute, *Whose Roads? Evaluating Bicyclists' and Pedestrians' Right to Use Public Roadways*, 11 December 2013.

132. Quoted in Stephen B. Goddard, *Getting There: The Epic Struggle Between Road and Rail in the American Century*, (Chicago: University of Chicago Press, 1996), p.110.

133. See note 17.

134. Ibid., p.39.

135. In 2011, fuel tax revenues amounted to £26.7 billion (US$45 billion). In budget year 2012-13, overall public sector expenditures on transportation, at all levels of government, totaled £19.3 billion (US$32.8 billion); of that total, £8.5 billion (US$14.4 billion) was spent on local and national roads. See note 17, p.39.

136. Ibid., p.35.

137. Ibid., p.36. In addition, since 2004, Germany has had a partial user-pay system in the form of widely-implemented per-mile tolls for heavy trucks on certain federal highways. This toll varies depending on the vehicle's emissions category, from EUR 0.141 to EUR 0.288 (U.S. $0.19 to U.S. $0.39) per kilometer, and brings in a little over EUR 3 billion (U.S. $4 billion) in annual revenues, which are dedicated specifically to road-related projects.

138. Ibid., p.33.