

**Allocating Transportation Revenues to Support Climate Policies
in California and Beyond¹**

Gian-Claudia Sciara
The University of Texas at Austin
Amy E. Lee
University of California at Davis

Abstract

California has established itself as a leader in efforts to reduce greenhouse gas emissions from transportation. However, the state has not reflected its ambitious policies for greenhouse gas (GHG) reduction and climate action in its practices for allocating state transportation funding. This paper reviews the complex systems through which California generates and allocates state revenue for transportation investment. It finds that the state's framework for funding transportation projects and programs is disconnected from its GHG goals, reflective more of historical political deals than of contemporary climate policy. The paper also suggests preliminary steps for revising this framework to reinforce GHG reduction goals. Such recommendations are particularly salient given the state's recently completed study of road user charges as an alternative transportation revenue source, as well as the passage of new legislation that restructures the state's fuel taxes (Senate Bill 1, 2017). Implementation of road charges or any other new or revised transportation revenue source would need to address the disposition of revenues generated. This paper argues that California should use any such opportunity to align the distribution of state transportation dollars with its climate objectives, not fall back on status quo allocation practices.

Connecting Transportation Dollars to Climate Commitments

California's efforts to reduce greenhouse gas emissions are well known. Over the last two decades the state has made numerous policy commitments to lowering GHG emissions overall and particularly the large share of GHGs generated by transportation. State policies have encouraged production of low- and zero-emissions motor vehicles, required reductions in the carbon content of motor fuels, and worked to reshape urban and suburban development so as to lessen residents' dependence on automobile travel. Many of these initiatives have attracted national attention.

Less is known, however, about whether or how California's practices for distributing state transportation funding reflect its GHG reduction and climate action objectives. California's

¹ This work was supported by The University of Texas at Austin School of Architecture and the National Center for Sustainable Transportation at the University of California–Davis. The authors acknowledge the constructive comments from anonymous reviewers.

framework for allocating state level transportation resources is notoriously complex, captured in a wall-sized flow diagram known affectionately as Chart C. State transportation funding has historically followed a boom-and-bust pattern, and concerns about how to raise revenue for transportation have often trumped discussion of how those revenues are or should be distributed.

This paper reviews the complex rules and processes through which California allocates the revenue collected by the state to invest in transportation and considers how current allocation practices reflect historical political bargains. It analyzes how the state distributes transportation revenue among different claimants, asking whether the state's distributional approaches reinforce its climate goals. Theories of sustainability as well as the state's climate goals are held against state transportation policy commitments.

Our work inventories the various transportation revenue sources authorized and collected by the state of California along with the statutory and administrative provisions conditioning distribution of those funds. We classify those provisions according to the policy principles they reflect, making clear how policy concerns are reflected in transportation funding flows.

This exploration reveals that the state framework for funding transportation is largely disconnected from its transportation-related climate goals and that its ambitious climate objectives are not fully reflected in its practices for allocating transportation revenue. Rather, transportation funding is distributed by formulae more reflective of historical political deals and statewide geopolitics than of contemporary climate policy. The state's recent transportation funding bill, the Road Repair and Accountability Act of 2017, known as SB 1, includes some encouraging changes. Still, these are modest and influential only at the margins. Overall, the bill relies more on inherited statutory formulae for distributing funds than on any new framework, suggesting how difficult it may be to revisit and replace decades old political bargains embedded in state law.

This paper is organized first to discuss California's policy commitments to climate action. Next it considers the meaning of sustainability in the transportation context and asks how we can evaluate whether public funding commitments support sustainability in the transportation sector.

Next it traces the current flows of transportation funding in the state and the policies through which they are allocated. It shows how the existing framework is overly complex and unstable, lacks transparency, and does not serve GHG reduction. It describes these flows for the FY 2016–2017 and for the new funding flows from the Road Repair and Accountability Act, known as SB 1, passed in 2017. Finally, it offers several practice-based recommendations for shifting state allocation policies and practices to better support GHG reduction, in California as well as in other states that would do so.

Climate Action through Transportation in California

California has been working since the 2000s to understand and address climate concerns across various sectors of the state's economy, and state elected officials have made significant commitments to reducing transportation-related GHGs. In 2006 the legislature passed the Global Warming Solutions Act (also called AB 32), which committed California to lowering GHG emissions to 1990 levels by 2020, the amount that most climate scientists agree is necessary to stem global warming from GHGs. A companion executive order aimed to reduce GHG emissions 80 percent below 1990 levels by 2050 (Calif. Exec. Order No. S-3-05). The state has added aggressive interim goals as well. Governor Jerry Brown called for reducing GHG emissions to 40 percent below 1990 levels by 2030, as well as reducing petroleum use to 50 percent below 2015 levels by 2030 (Calif. Exec. Order No. B-30-15). The targets reflect scientific consensus around

the GHG emissions reductions that are needed to keep global warming at or below two degrees Celsius and to avoid potentially catastrophic disruption to human civilization and natural ecosystems.

State policies have aimed to wrest GHG reductions from transportation in particular, reflecting the sector's outsized contribution to GHGs. In California, automobile tailpipes emit 39 percent of the state's GHGs and are the largest source of GHGs emissions, even before accounting for upstream GHG emissions from such activities as extraction and refining. By comparison, about 29 percent of U.S. GHG emissions are attributed to transportation (U.S. Environmental Protection Agency 2018, 2–24). And while transportation-related GHGs declined in California from 2008 through 2013, the state's most recent emissions inventory shows they have since increased, a circumstance attributed to population growth, lower fuel prices, and economic and employment gains (California Air Resources Board 2017).

California has adopted a three-pronged approach to reduce transportation-related GHG emissions. First, the state has various policies in place that seek to make motor vehicles more efficient, and thus consume less fuel per mile driven. Second, several state initiatives work to reduce the carbon content of motor fuels so that burned fuel produces less greenhouse gas emissions. A third approach aims to reduce the amount of driving that Californians do by changing underlying land use and development patterns in the state. This goal is embodied in the state's Sustainable Communities and Climate Protection Act, or SB 375, and is of direct interest to our inquiry into whether and how state expenditures on transportation infrastructure further California's GHG reduction goals.

State policymakers have increasingly acknowledged that reducing vehicle miles of travel (VMT) logged by Californians must figure centrally in state efforts to reduce transportation GHGs.

Until SB 375, California had traditionally targeted vehicle and fuel technologies to reduce carbon emissions, for instance by “establishing emissions and performance standards for new vehicles and fuels, setting mandates and sales requirements for advanced technologies, developing pilot programs, and implementing incentive and other programs to accelerate technology deployment” (California Air Resources Board 2016, 32). The California Air Resources Board (ARB) analysis indicates, however, that cleaning the vehicle fleet will not suffice to meet the 40 percent GHG emissions reduction targets for 2030 and that significantly reducing driving must accompany California's technology-focused GHG approach. Agency analysis suggests that, by 2050, California will need absolute reductions in total light-duty VMT of 15 percent below its 2050 baseline estimates if it is to meet its climate policy goals. Additionally, ARB projects that state climate and petroleum reduction goals would require growth in light duty VMT not to exceed five percent by 2030; however, existing 2030 baseline projections show that total statewide light-duty VMT is set to rise 11 percent over current levels by 2030 (California Air Resources Board 2016, 36–37).

Passed in 2008, SB 375 aims to attenuate automobile reliance in the state by changing development patterns. The law requires the state's metropolitan regions to develop visions for future land use and transportation investment that will allow Californians to use private vehicles less and use transit, cycling, and walking for more trips. The state's four largest regions are tasked with reducing GHG emissions by 8 to 15 percent below 2005 per capita levels by the year 2020, and by 19 percent by 2035 (California Air Resources Board 2018). To do so, each region includes a new component in its regional transportation plan. The new plan element, a “Sustaina-

ble Communities Strategy” (SCS), outlines transportation investments and land-use strategies that together would reduce Californian’s reliance on driving.

California has also taken other steps to ensure that its GHG reduction goals infuse other state transportation activities. The Department of Transportation (Caltrans) adopted its own Director’s Sustainability Policy (DP-33) in 2015 to support the state’s existing sustainability goals (Dougherty 2015). The policy outlines specific principles to guide Caltrans’s activities in support of the state’s signature climate laws, including AB 32, SB 375, SB 391 (which call for the statewide California Transportation Plan to reflect GHG emissions reductions goals) and SB 743 (which made VMT the new metric for transportation impacts under CEQA, addressing GHG emission reductions over vehicle delay. Sustainability proponents have further advised Caltrans to make more “fundamental adjustments in the way [it] exercises its statutory authority,” including revising Caltrans’s institutional mission and reconsidering its department structures, expertise, and staff allocation (State Smart Transportation Initiative 2014, 18).² In sum, California has adopted ambitious goals for reducing transportation-related GHGs and making mobility more sustainable. It has fixed GHG targets and acknowledged the driving reductions needed to achieve them. An important but unexamined question, however, is whether and how the allocation of state transportation revenue reflects these ambitions. When the state invests in transportation infrastructure, does it distribute resources in ways that support the necessary transition to a lower-VMT future? This paper takes up that question.

We open for discussion how sustainability principles could figure more explicitly into choices about allocating transportation revenue in California and, by extension, in other states too. We observe that California climate policies in transportation are not yet reflected in the statutes that direct state transportation funds. We also note that California has been actively exploring the potential use of distance-based road charges in lieu of fuel taxes to fund transportation. If pursued, a transition to road charges would present a significant opportunity to revisit and restructure how the state allocates transportation revenue. As with any new revenue source, a road user charge would inevitably require new state legislation to enable its collection, allocation, and expenditures. The task of developing the statutory framework to support road charges could be a starting place for better incorporating state climate and GHG reduction objectives into transportation revenue allocation. Embedding sustainability objectives into the allocation of transportation funds would be a fundamental departure from current practice.

Applying Sustainability Principles to Transportation Investments

Many public-sector transportation organizations have begun to look for ways to enhance sustainability in their activities. One recent federal report considers sustainability as an “organizing principle for transportation agencies” and observes that transportation officials do not see sustainability as “just another thing.” Instead, “[i]t’s the thing. Considering the triple bottom line helps agencies ensure that their programs contribute to a strong economy, a healthy environment, and a vigorous society in a manner that garners public support” (Booz Allen Hamilton 2014, National Cooperative Highway Research Program 2014).

Sustainability can be an organizing principle that directs not only transportation agency activities but also, and more fundamentally, how it uses resources to prioritize its activities. How

² SSTI promotes environmental and economic sustainability in transportation practices and is a joint initiative of the University of Wisconsin and Smart Growth America.

should we assess practices for allocating transportation funding in light of broad sustainability concerns and California's own specific climate goals? We propose a framework that both draws on accepted principles in established sustainability theory and that considers the reduction of vehicle miles of travel (VMT) as a primary criterion for funding allocation.

Well-recognized schools of thought have operationalized criteria for assessing sustainability; their application to transportation finance and policy is a starting point for our framework. The Brundtland Commission's foundational definition noted that sustainable development would meet "the needs of the present without compromising the ability of future generations to meet their own needs"; reflect "the ability of the biosphere to absorb the effects of human activities"; and also aim for decentralized governance, with local needs managed largely by local authorities connected to the urban poor and neighborhood groups (World Commission on Environment and Development 1987). Subsequent work argued that sustainability should deliver a "triple bottom line," protecting the environment, enhancing the economy, and also improving equitable economic opportunity and social justice (Elkington 1997, Campbell 1996).

Subsequent critiques have argued for environmental health as the ultimate bottom line, as neither the economy nor social well-being can flourish without it. California climate policy reflects this focus in the transportation arena; state policies suggest that sustainable transportation requires more than simply meeting environmental or air quality requirements, as stipulated by laws like the National Environmental Policy Act or the Clean Air Act Amendments. Reducing congestion, and investing in public transit, bicycling, and walking modes are also necessary but insufficient for achieving more sustainable transportation systems. Instead, California's approach puts new demands on transportation agencies to mitigate transportation's GHG emissions and climate impacts for the long term, rethinking conventional investment patterns and changing mobility patterns and travel behavior along the way.

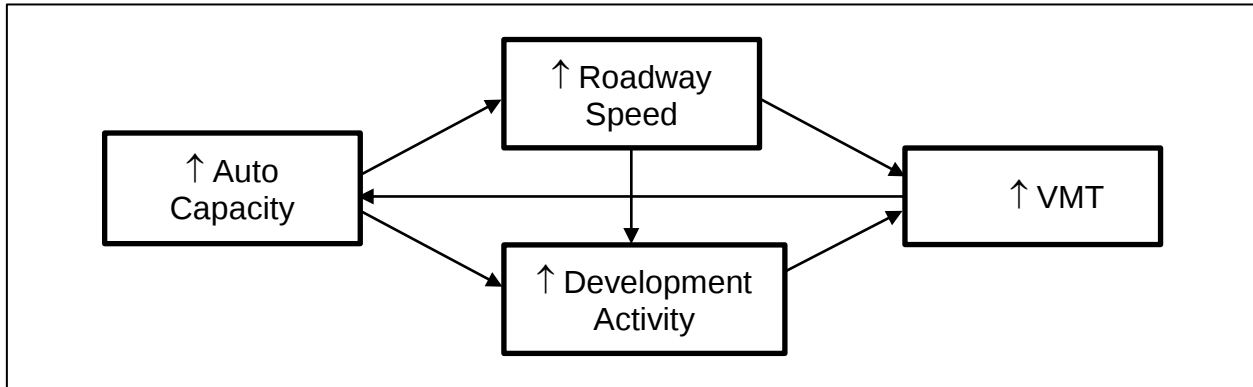
Principles of fiscal sustainability drawn from public finance also deserve consideration in the allocation of California transportation resources. Fiscal sustainability requires that revenue and budgeting practices support the "ability to operate [public services] over the long term without reducing standards of life below those currently enjoyed and even to improve the standard." These principles, invoked most often in debates surrounding public debt, discourage borrowing to meet current needs when future generations will be left paying for services provided in the past. They also raise questions about whether fiscal actions now "reduce the capacity of future generations to live at least as well or better than we do now" (Mikesell 2010, 2–3, 139).

Hence, fiscally sustainable public infrastructure investments should emphasize transportation systems that would improve quality of life in the future, reduce GHGs, and mitigate climate change.

California has committed to ambitious GHG reduction goals and, through SB 375, acknowledges that reducing the amount that Californians drive is necessary for reaching those goals. To assess whether the allocation of state transportation dollars supports sustainability, one must therefore ask whether the state directs those funds in ways that decrease automobile reliance, measured in vehicle miles of travel (VMT).

Evidence from the transportation and travel behavior literature suggests the kinds of transportation investments that can help to reduce VMT. This literature shows that how much and by what mode (e.g., car, transit, cycling, or walking) a person travels is influenced by land-use patterns, the accessibility of activities, and mobility options present (Mitchell and Rapkin 1954). Transportation investments in additional roadway capacity, on one hand, are likely to add to vehicle travel. (See Figure 1.) A key study of highway expansion projects in suburban areas showed that

Figure 1: Automobile Capacity and Induced Vehicle Miles of Travel (VMT), adapted from Cervero 2003



highway expansion was positively correlated with additional development along the corridors; further, that additional development, together with the initial increase in travel speeds provided by the expanded roadway, increased the travel demand in the corridor and led to increased VMT (Cervero 2003).

On the other hand, research suggests that the presence of walking, cycling, and transit alternatives to driving may lead to less driving. Proximate and convenient transit service is associated with higher rates of transit use (Ewing and Cervero 2010), and existing cycling and walking infrastructure and investments in such infrastructure are positively associated with bicycle commuting and utilitarian walking trips (Pucher and Buehler 2012, Dill and Carr 2003, Handy 1996). While the magnitude of VMT reductions that investments in such infrastructure might produce is unclear, it is clear that higher rates of transit use, bicycling, and walking will be needed to reach California’s GHG emissions targets.

Generating and Allocating Transport Revenue in California

To assess whether California allocates state transportation revenue in ways that reflect its climate and sustainability objectives, we must consider the sources of state transportation revenue and the statutory provisions associated with their expenditure. Here, we describe the chief state revenue

sources supporting transportation in California and trace the flow of those revenues through the primary state funding accounts to specific recipients and for expenditure on specific modes, systems, and services. We consider this picture critically, with an eye toward understanding whether current distributional patterns reflect state sustainability policies and practices in the ways we have defined.

A comprehensive picture of California’s transportation revenues and their disposition requires information from various sources. Our primary interest lies in whether the state allocates its own-source revenues following its climate and GHG objectives. This leads us to focus on Caltrans’s Chart C, which tracks the flow of all *state-generated* transportation revenues. We do not address the flow of federal and local transportation resources in the state, as captured in Califor-

nia’s Federal State Transportation Improvement Program (FSTIP) and the State Controller’s Office Local Streets and Roads Report.

Sources of State Transportation Revenue: The View from Chart C

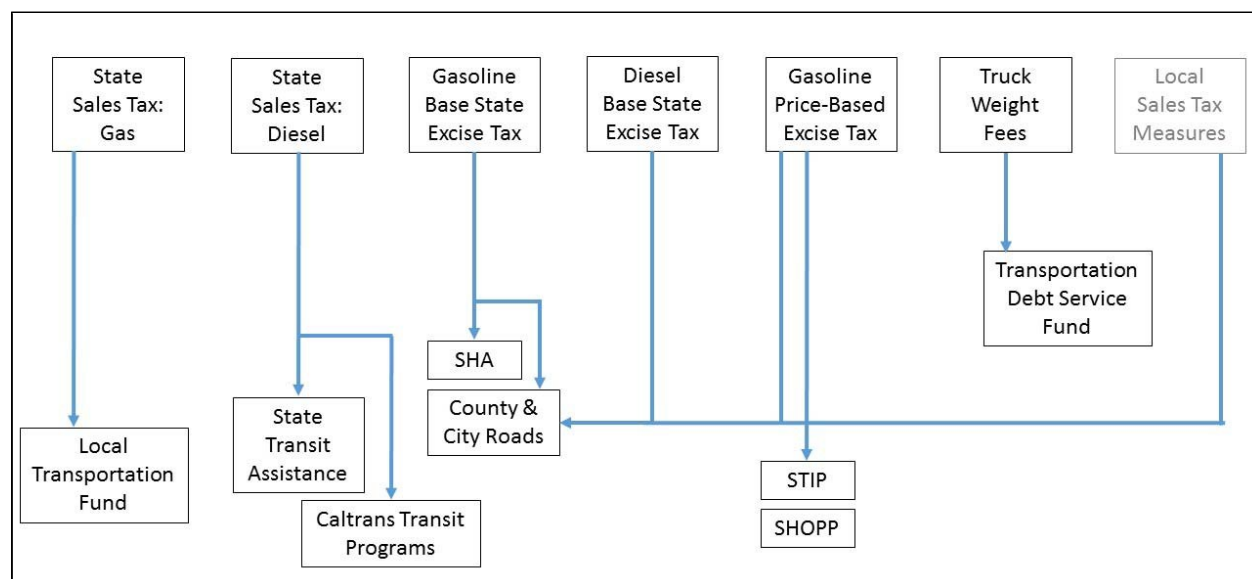
California relies on a fairly traditional set of taxes and fees to fund transportation investment; these include per-gallon gasoline and diesel fuel excise taxes, sales taxes on motor fuels, and an assortment of vehicle fees. This section inventories these own-source transportation revenues and their disposition. (See Figure 2.) Along the way, it discusses 2017 legislative changes, under SB1, that have eliminated the complex and fiscally tumultuous “fuel tax swap” enacted in 2010 and that have increased and expanded state transportation revenues. The section also aims to convey how the allocation of a revenue source reflects myriad political deals struck at different points, among different interests, under intense competition for resources. Comprehensive discussion of such deals is beyond our present scope. Yet, other scholars have admirably chronicled the intricate political twists and turns yielding current allocation rules (Brown, Garrett, and Wachs 2016; Giordano 2007; Taylor 1992), and an overarching observation is worth noting:

Over the years, the revenues generated by each of these finance mechanisms was dedicated, and in some cases legislatively or constitutionally restricted, to specific transportation-related uses. During times of fiscal distress, however, some of these monies also became prime targets for addressing budget shortfalls through borrowing or by simply diverting them from transportation funds to meet more immediate needs (2016, 5)

Base state excise tax on gasoline. The gasoline base state excise tax is a per gallon tax levied on each gallon of gasoline sold. Until recently, the tax had been set at 18 cents per gallon (cpg) since 1993, and proceeds have traditionally flowed to the Highway User Tax Account (HUTA) for road investment by state and local governments. Article XIX of the state constitution restricts the use of excise-based revenues to transportation purposes. The recent SB 1 legislation raised the tax to 30 cpg and has indexed it to inflation for the very first time. Increments of revenue from this 12-cent increase will flow to a new “Road Maintenance and Rehabilitation Account” and be shared evenly between the state and local governments after funds are set aside for a number of special programs designed to incentivize local government behavior. Proceeds from the initial 18-cpg tax will follow existing statutory formulae. (See Tables 1 & 2).

Fuel tax swap/gasoline price-based excise tax. The state has collected an additional per-gallon excise tax against gasoline sales since the fuel tax swap of 2010, initiated by the legislature to circumvent a court ruling that stopped the state from using gasoline sales tax revenues for bond repayment. (In the late 2000s, the governor began budgeting gasoline sales tax to repay transportation bonds and thereby to relieve the state’s General Fund. Article XIX of the state constitution allows the use of gasoline excise taxes for highway bond debt service but prohibits the use of gasoline sales tax for that purpose [Brown, Garrett, and Wachs 2016]). The per-gallon rate of the price-based excise tax has been adjusted each year since 2010 to mimic the state sales and use tax on gasoline sales, which the fuel tax swap had partially eliminated. The rate was 18 cents per gallon in FY2014–15 and 12 cents per gallon in FY2015–16. Proceeds are first used to replace or “backfill” truck weight fees that have been diverted to the state General Fund (see be-

Figure 2. Flow of California State Transportation Revenues



low); remaining balances are allocated to local road funds, the State Transportation Improvement Program (STIP), and the State Highway Operation and Protection Program (SHOPP).

Statewide sales and use taxes on gasoline. The state of California collects 7.5 percent sales and use tax on a broad array of goods and services. The fuel tax swap enacted by the state legislature in 2010 eliminated most of the state sales and use tax on gasoline (Brown, Garrett, and Wachs 2016), reducing the tax rate for gasoline sales to 2.25 percent. The SB 1 legislation of 2017 left this rate unchanged. Only a portion (0.25 percent) of the gasoline sales tax goes toward transportation expenditures. The state collects these funds but, following a deal struck in the Transportation Development Act in 1971, returns the proceeds to counties for their local transportation funds, allocating the funds to each county according to the share of the total collected in each county. Thus, as the dollar value of gasoline sales in a county increases, that county's take-home share of sales tax revenue also increases, following a "return to source" distributional principle disconnected from state climate policy and goals to reduce automobile reliance. Further, within each county, the funds are allocated to transit operators on the basis of population, not ridership, failing to reward operators that serve more passengers and favoring suburban transit operators (Taylor 1992, 162).

Base state excise tax on diesel. Following the fuel tax swap, the rate of this tax has been adjusted each year since 2010. It was 11 cpg in Fiscal Year 2014–15, for example, 13 cpg in FY 2015–16, and 16 cpg in FY 2016–17. (Because the fuel tax swap required revenue neutrality among revenue instruments, annual adjustments to the excise tax rate have been needed to offset any increase in revenues from the diesel sales tax.) Diesel excise tax revenues are deposited to the Highway Users Tax Account (HUTA); following another political compromise sealed in state statute, the first six cents are apportioned to local road funds and the remaining balance to

the State Highway Account. In 2017, the transportation funding law SB 1 increased the tax to 36 cpg in 2017 and indexes it to inflation as of 2020.

Statewide sales and use tax on diesel. Revenues from the state's diesel sales tax are deposited into the state's Public Transportation Account and are the primary state funding for mass transportation. Although the 2010 fuel tax swap eliminated most of the state sales and use tax on *gasoline*, it retained—and even increased—the tax for diesel fuel sales. (The legislature used the increase to offset the loss of transit funding due to elimination of gasoline sales taxes.) In 2017, the state levied 9.25 percent sales and use tax on diesel, with 6.5 percent that allocated to transportation purposes, mostly to transit agencies. SB 1 legislation increased the diesel sales and use tax to 13 percent.

Truck weight fees. The California Department of Motor Vehicles assesses weight fees based on gross weights of commercial vehicles. Revenues are transferred to the Transportation Debt Service Fund to reimburse the state General Fund for debt service on voter-approved transportation bonds.

Motor vehicle license fee. This fee collects 0.65 percent of a vehicle's market value, as calculated by the state Department of Motor Vehicles (DMV) and its revenues support the DMV's regulatory functions.

Motor vehicle registration and driver license fees. These include \$46 of motor vehicle registration fees, \$52 of off-highway vehicle registration fee, and \$33 of driver's license fees. Revenues flow to the Motor Vehicle Account and largely fund the California Highway Patrol rather than explicit infrastructure investments.

Transportation improvement fee. The 2017 funding legislation added a new annual vehicle charge, based on the value of the vehicle. Fee proceeds are designated specifically to fund transportation improvements, with set asides for public transit and congested corridors, and remaining funds flowing to the new Road Maintenance Rehabilitation Account.

Zero-emission vehicle registration fee. SB 1 funding legislation also created a new Road Improvement Fee assessed for registration of zero-emission vehicles. Fee proceeds flow exclusively to the Road Maintenance Rehabilitation Account, again exclusively for transportation expenditures.

Course Correction or Status Quo?

Local Revenues and New State Funding Law SB 1

Overall, the picture that emerges of transportation funding in California suggests that its current distributional framework attends far more to inherited claims than to current policy objectives. Major pots of funding have been divided among recipients following many different motives (Brown, Garrett, and Wachs 2016; Giordano 2007; Taylor 1992), not a unified distributional rationale and not climate action. The proceeds of the individual revenue sources outlined above have been divided over time to satisfy claims that follow different geographic, jurisdictional, or modal lines or that reflect population shares. The legislature has layered *ad hoc*, incre-

mental distributional solutions atop one another, producing a system that is also too complex for all but the most seasoned transportation finance experts to penetrate.

We further observe that the majority of inherited claims to state transportation funding are for automobile infrastructure and for the administration and enforcement of laws governing vehicles that use this infrastructure. Approximately 16 percent of 2016–17 transportation revenues fund the State Highway Operations and Protection Program (SHOPP), nearly three percent exclusively fund development of new highway capacity via the State Transportation Improvement Program (STIP), and 31 percent fund the California Highway Patrol and Department of Motor Vehicles. Only five percent fund state transit capital outlay and operations, and 13 percent fund local transit agencies. Additionally, 13 percent of revenues (from fuel taxes) are subventions directly to cities and counties for local transportation purposes and thus expend transportation revenues largely at the discretion of local public works agencies. These proportions are shown in Figure 3.

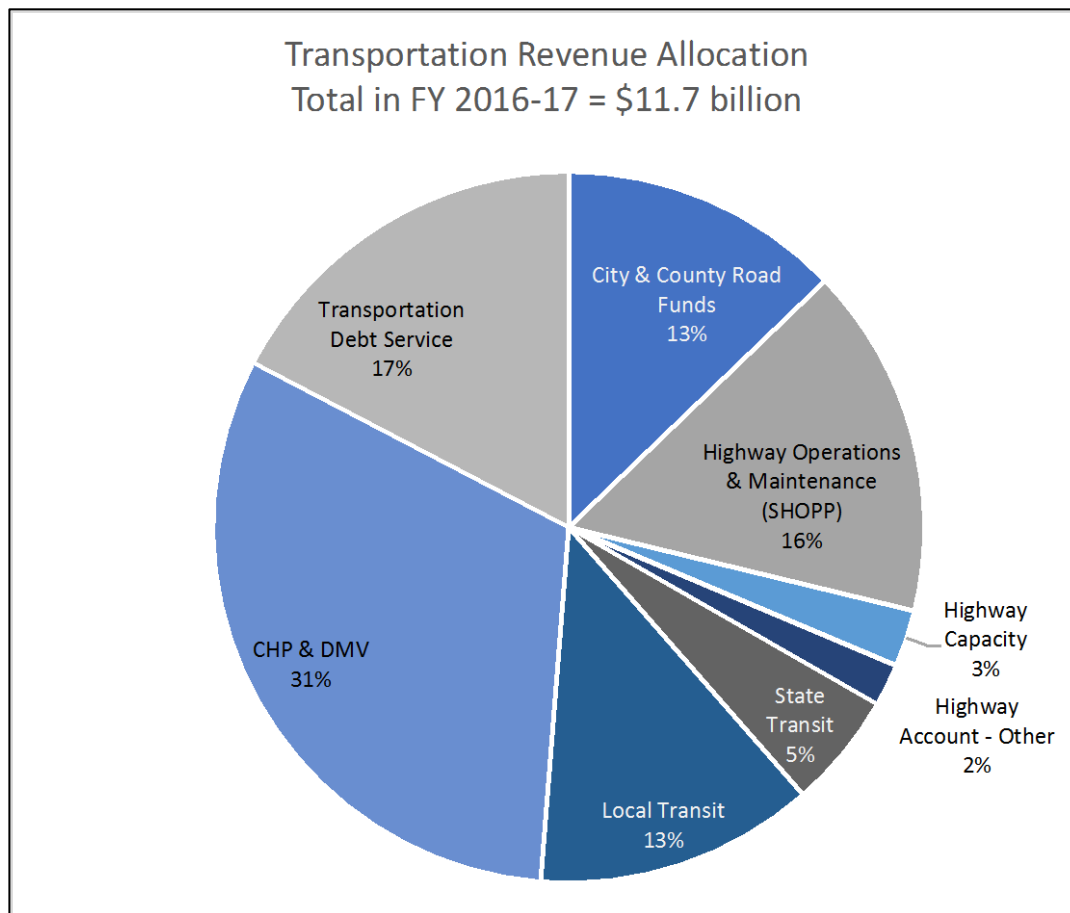
Local transportation revenues, though not the primary focus of this paper, provide roughly 50 percent of transportation funding in the state and deserve mention (Elkind 2011). Local jurisdictions increasingly supplement state transportation revenues from fuel taxes with local transportation revenues, frequently raised from sales taxes (Goldman and Wachs 2003). Transportation spending decisions and distributional rationale are thus made at “multiple, often uncoordinated levels without requirement that those dollars are spent to align with AB 32 or SB 375 implementation” (Elkind 2011).

From a climate action perspective, local sales taxes used for transportation may be “the 800-pound gorilla in the room” (Rose 2011, 20). California’s Self-Help Counties Coalition estimates that local sales tax measures generate between \$3 billion and \$4 billion annually in transportation investment. And while California’s SB375 asks metro regions to meet GHG reduction targets through Sustainable Communities Strategies for transportation and local land use, it exempts transportation projects in pre-2011 local sales tax spending plans from evaluation of progress toward those targets. Grandfathered local-tax funded projects thus escape scrutiny for their GHG impacts and may limit the ability of metro regions “to meet SB375 targets if their expenditure plans are focused on accommodating automobiles” (Rose 2011, 22).

The state’s recent Road Repair and Accountability Act, also known as SB 1, makes some encouraging changes to the state’s own-source transportation revenues. Enacted in 2017, the law has on one hand helped to enhance fiscal sustainability for California transportation funding. SB 1 increased state transportation funding, and it unraveled the disastrous California “fuel tax swap” that had led to severe funding instability since its 2010 introduction. On the other hand, the new law retained existing structures for allocating state funds and made few changes to explicitly reward sustainable transportation or to encourage investments that will secure a less automobile reliant future above all.

On the positive side, SB 1 is anticipated to increase state revenues for transportation by an average of \$5.2 annually over the next decade (Taylor 2017). The law also eliminated the “fuel tax swap.” The legislature initiated the swap in 2010 to replace California’s sales tax on gasoline with a new increment of per gallon excise tax on gasoline, to be added to the existing 18-cpg excise tax. Legislators had aimed to shift revenues away from the state sales tax on gas, levied on the price of a gasoline sale, to the fuel excise tax, levied per gallon on the volume of sale. Because the state sales tax is not constitutionally restricted to transportation spending, it had proven vulnerable to diversion by state leaders to meet other nontransportation state needs during economic crises. The state constitution reserves the fuel excise tax, however, exclusively for transportation expenditures, making it more secure than a sales tax on fuels.

Figure 3: Allocation of California State Transportation Revenues



The fuel tax swap ultimately produced severe instability in transportation revenues, however, and negatively impacted state transportation entities reliant upon them. Legislated to be revenue neutral, the swap required that the new increment of per gallon excise tax produce no more or less than the gas sales tax it replaced. The state would estimate the annual per gallon rate to mirror anticipated gasoline sales tax revenues under anticipated fuel prices. When the real gasoline prices went below or above state estimates, however, the state would adjust the price-based tax rate *post hoc* for the next year, accounting for any shortfall or surplus the tax had produced. These *post hoc* corrections created significant problems and instability for state transportation funding and the entities that administer it (Brown, Garrett, and Wachs 2016).

The Disposition of State Transportation Revenue: The View from Chart C

Having accounted in the preceding discussion for the own-source transportation revenues that California collects, we now consider how the state distributes those revenues. Specific instructions written into state statute and code, referenced in Table 1, direct the flow of revenues, typically shunting them first to holding accounts and next to other, more specific accounts often

dedicated to a set of transportation purposes. The state’s Chart C captures the flow of funds through accounts in detail, and we provide a simplified version in Figure 2. Revenues from most sources are divided and subdivided and sometimes recombined with funds from other revenue sources several times before the dollars reach their ultimate recipients for expenditure.

We researched the statutory instructions and decision rules that are used to allocate these revenue sources in a series of steps. We then applied these rules to projected revenues for FY 2016–17 to provide an example of how and at what split or phase of allocation the different instructions apply, as shown in Table 2 and, pictorially, in Figure 3.

Our analysis shows that a handful of key allocation rules of thumb govern how the state distributes its resources. These principles most commonly consider a jurisdiction’s or region’s population, the number of centerline miles of roadway, grandfathered distinctions grouping California counties into North (Group 1) and South (Group 2),³ numbers of registered vehicles, and an often repeated city and county formula (Assembly Committee on Transportation 2008).

This mapping of transportation revenues and their distribution suggests both the complexity of California’s transportation finance picture and the disconnect between high-level (in contrast to project level) resource allocation and the state’s GHG and climate objectives. This allocation framework reflects myriad incremental decisions made over decades to direct revenues from different sources. None of the allocation principles takes into account the performance or promise of different modes or of different jurisdictions for shrinking automobile use and GHGs.

Opportunities to Align Revenues with Climate Goals

California invests significant sums in its transportation system each year. The state revenue sources accounted for here have typically generated about \$5–6 billion annually for transportation investments, and SB 1 will add about another \$5 billion annually. Yet, these dollars are allocated following largely inherited (“antiquated,” say Chen and Rehman 2015) formulae that have been negotiated to broker the politics of modal siloes; administrative, geographic, and jurisdictional divides; and competition for state resources. Current allocation practices do not support the evolution of California communities toward reduced reliance on cars less or increased use of alternative travel modes.

How might policymakers allocate state transportation revenues in ways that advance California’s goals to reduce GHG emissions and motor vehicle dependence? We offer for discussion several adjustments to transportation revenue allocation that policymakers could implement, harnessing state investments to reward GHG reductions and reduce auto reliance.

Allocate More State Transportation Revenues to MPOs

To better support SB 375, statutory reforms could expand the share of state transportation revenues allocated to metropolitan planning organizations (MPOs). A similar proposal to give

³ Group No. 1 (North). All those counties not included in Group No. 2: Del Norte, Siskiyou, Modoc, Humboldt, Trinity, Shasta, Lassen, Tehama, Mendocino, Glenn, Butte, Plumas, Sierra Lake, Colusa, Sutter, Yuba, Nevada, Placer, Yolo, El Dorado, Sonoma, Napa, Solano, Sacramento, Amador, Alpine, Marin, Contra Costa, San Joaquin, Calaveras, Tuolumne, San Francisco, San Mateo, Alameda, Santa Clara, Stanislaus, Mariposa, Merced, Madera, Monterey, San Benito, Fresno, and Kings.

Group No. 2 (South). The counties of San Luis Obispo, Kern, Mono, Tulare, Inyo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, San Diego, and Imperial.

Table 1. Chart C Revenue sources, legal bases, revenue rate and absolute revenues**

**Does not reflect changes enacted under the 2017 Road Repair and Accountability Act (SB 1)

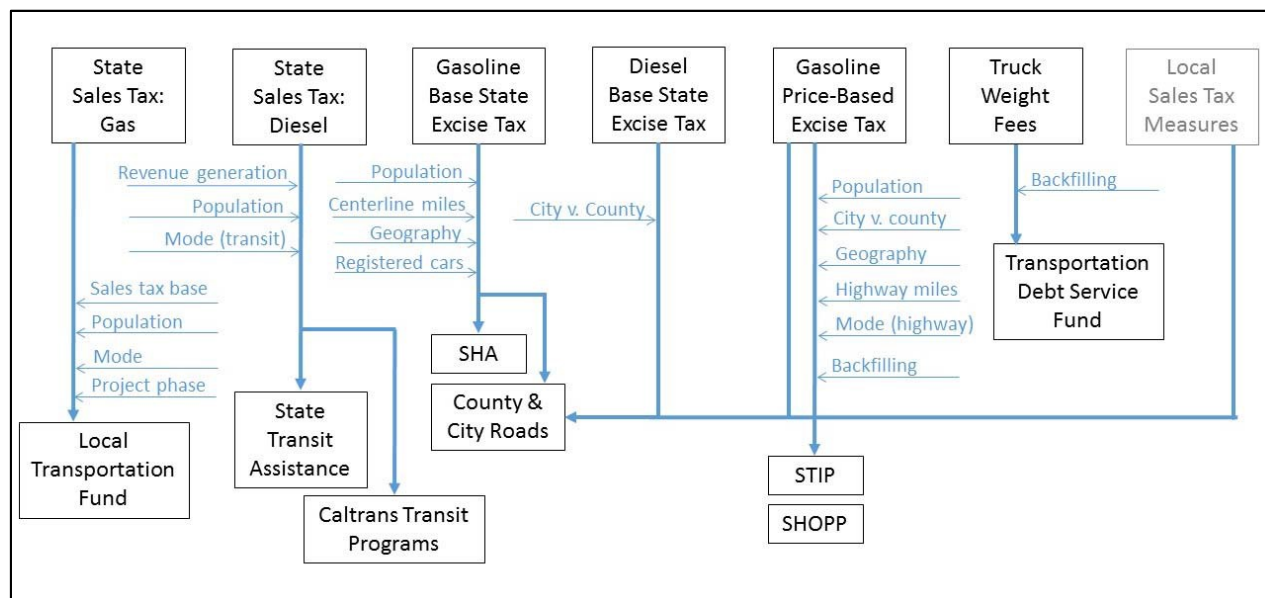
Source	Legal Basis	Rate	Revenue 2016-2017	Allocation Rules
Statewide sales and use tax (0.25% for local transportation projects)	<i>Transportation Development Act (1971); Proposition 30 (2012)</i>	7.5% total		
a. Gasoline	AB 105 (2011)	2.25% (only 0.25% for transportation)		• 0.25% of the 2.25% state sales tax collected on gasoline goes to counties exclusively for transportation purposes (not general fund purposes) via Local Transportation Fund. The state BOE distributes county shares in proportion to what they generate. http://www.boe.ca.gov/legdiv/localTaxAllocations.htm
b. Diesel	<i>RTC, Sections 7101 - 7107, 6051.8, 6201.8, & 6357.3 Proposition 22 (2010)</i>	9.25%	\$616 million	• 4.75% split equally between the state & STA for local transit agencies • 1.75% goes to PTA then to State Transit Assistance fund (STA) for ops & capital (equal amounts get lowered through excise for what goes to SHA)
Gasoline base state excise tax	<i>RTC, Sections 7360(a)(1), 8651(a)(5) & 7392 Proposition 111 (1990)</i>	18 cents per gallon	\$2,793 million	Revenues deposited to Highway Users Tax Account & distributed: • 36% City & county road funds (subvention) • 64% State (State Highway Account)
Diesel base state excise tax	<i>RTC Sections 60050(b)(1) - (2) & 6201.8</i>	Variable* (11 cents per gallon in FY 14/15; 13 cents per gallon in FY 15/16)	\$418 million	• Revenues deposited to Highway Users Tax Account. The first six cents are apportioned to cities and counties; the balance is transferred to the State Highway Account.
Gasoline price-based excise tax	<i>RTC, Sections 7360(b)(1); ABx8-6, SB 70 (2010); AB 105 (2011)</i>	Variable* (18 cents per gallon in FY 14/15; 12 cents per gallon in FY 15/16; 9.8 cents per gallon in FY 16/17)	\$1,699 million	• Revenues used first to back fill weight fees diverted to General Fund. Remaining funds allocated to: - o 44% Local roadways - o 44% STIP (new construction) - deposited to SHA - o 12% SHOPP (hwy maint & ops) - deposited to SHA
Truck weight fees	<i>Vehicle Code, Sections 9400 - 9410 & 42205(a)</i>	Based on gross weight of commercial vehicles	\$1,015 million	Deposited to SHA & transferred to Transportation Debt Service Fund to reimburse the General Fund for debt service on voter-approved transport bonds.
Motor vehicle registration and driver license fees	<i>Vehicle Code, Sections 9250 - 9271 (Motor Vehicle Reg); 14900 & 14900.1 (Driver's Lic), 38225, 38225.4, 38225.5 & 38230 (Off-Highway Vehicle Registration), 1678 & 1685</i>	\$46 motor vehicle registration; \$52 off-highway registration; \$33 driver license fee	\$3,107 million	Deposited to Motor Vehicle Account to fund the California Highway Patrol for traffic enforcement.
Motor vehicle license fees	<i>RTC, Sections 10751 – 10760</i>	0.65% of market value of vehicles, as determined by the DMV	\$567 million	Deposited to Motor Vehicle License Fee Account to support Department of Motor Vehicles regulatory functions.

Table 2. California’s State-Generated Transportation Resources and Their Statewide Distribution (FY 2016-17)*

*Does not reflect the 2017 Road Repair and Accountability Act.

Revenue Source	Share of total	FY16-17	1st Split- Basis for Allocation	Share of total	1st Split	2nd Split - Basis for Allocation	Share of to-	2nd Split	3rd Split - Basis for Allocation	3rd Split	4th Split - Basis for Allocation	4th Split
Statewide sales and use tax: Diesel	5.3%	\$616	4.75% split equally between STA and state 1.75% to STA	3.8%	\$450 \$165.85	50% to Caltrans State Transit program 25% to RTPAs (via STA) 25% to transit operators (via STA) 50% by population share 50% by transit revenue share	1.9% 1.0% 1.0% 0.7% 0.7%	\$225 \$113 \$113 \$83 \$83	100% by population 100% by revenue generation	\$113 \$113		
Gasoline base state excise tax	23.9%	\$2,793	36% to cities & counties 64% to SHA	8.6%	\$1,005 \$1,788	50% to cities 50% to counties 100% for SHOPP	4.3% 4.3% 15.3%	\$503 \$503 \$1,788	100% by population 75% by registered vehicles 25% by centerline miles 45% to Group 1 Counties (North) 55% to Group 2 Counties (South)	\$503 \$377 \$126 \$804 \$983		
Diesel base state excise tax FY15-16 = \$0.13/gal	3.6%	\$418	First \$0.06 to cities & counties Balance (\$0.07) to SHA	1.6%	\$193 \$225	50% to cities statewide 50% to counties Balance reserved for State Highway Account	0.8% 0.8% 1.9%	\$96 \$96 \$225	100% by population 75% by registered vehicles 25% by centerline miles	\$96 \$72 \$24		
Gasoline price-based excise tax	14.5%	\$1,699	Weight Fee Backfill 44% to STIP for capacity 12% to SHOPP (hwy ops & maint) 44% to city & county road funds	8.7%	\$1,015 \$301 \$82 \$301	Cut off the top before the following allocations: 75% to RTIP 25% to Interregional TIPCaltrans 100% to SHOPP 50% to cities 50% to counties	8.7% 1.9% 0.6% 0.7% 1.3% 1.0% 0.3%	\$1,015 \$226 \$75 \$82 \$150 \$113 \$38	40% to Northern Counties 60% to Southern Counties 25% Interregional TIPCaltrans 100% to SHOPP 100% by population 75% by registered vehicles 25% by centerline miles	\$90 \$135	75% by population 25% by highway miles 75% by popula- tion 25% by highway miles	\$68 \$23 \$102 \$34
Truck weight fees	8.7%	\$1,015		8.7%	\$1,015	Funds Transportation Debt Service to reimburse General Fund	8.7%	\$1,015				
Motor vehicle reg. & driver license fees	26.5%	\$3,107		26.5%	\$3,107	Funds California Highway Patrol	26.5%	\$3,107				
Motor vehicle license fees	4.8%	\$567		4.8%	\$567	Funds Department of Motor Vehicles	4.8%	\$567				
Statewide sales tax: Gasoline (0.25%)	12.7%	\$1,488	0.25% for county local transp. funds	12.7%	\$1,488	100% to county TPAs by tax revenue generation for transit. TPAs to counties by population.	12.7%	\$1,488				
	100%	\$11,703		100.0%	\$11,703		100.0%	\$11,703				

Figure 4. Basis for Allocating California State Transportation Revenues



MPOs more direct responsibility for investing federal transportation revenue was included in a 2009 federal reauthorization proposal (Sciara 2017). Today in California, SB 375 asks MPOs to craft the land-use visions, or SCS, that will focus regional development around a sustainable and transportation efficient future. Yet current laws leave many regional allocation decisions to county-based transportation commissions.

Reward Regional Performance on Near-Term GHG Reduction

A further step could allocate proportionally more funds to MPOs that move to realize near-term VMT and GHG reductions. Under SB 375, an MPO's longer-term plan, or RTP/SCS, must show how the region will meet GHG reduction targets, but no similar requirement exists for the near-term projects in its transportation investment program or TIP. Allocation formulae could reward MPOs for reducing VMT and GHG emissions sooner rather than later, discouraging MPOs from delaying implementation of GHG-reducing projects like transit and active transportation to later years.

Develop and Use Sustainability Performance Criteria for Broader Allocation

The legislature could also allocate transportation funds by criteria that reward progress toward meeting climate policy goals. Virginia recently recast its own approach to allocation, requiring performance-based allocations that emphasize maintenance of the existing transportation system. California's own programs targeting GHG reductions provide other distributional models; the Affordable Housing and Sustainable Communities (AHSC) program, for example, uses climate-oriented performance metrics shown in Table 3 to competitively allocate program dollars. Similarly, the state could use allocation criteria to reward jurisdictions that improve job access by

Table 3. Project Criteria for AHSC Funds, 2015

Scoring Element	Criteria	Percent of Score
GHG Reduction	Estimated GHG emissions reduction per grant dollar requested	55%
Feasibility & Readiness	Capital project past performance Capital project readiness, capacity, need and leverage Capital project funds leveraged Implementation of previous planning efforts	15%
Policy Objectives	Accessibility to qualified employment areas Extent to which the project area incorporates walkable corridors Extent to which the project area incorporates features which encourage bicycling Extent to which the housing development serves lower- and moderate-income households Extent to which the project addresses co-benefits Anti-displacement strategies Community engagement	30%

nonsolo driving modes, that prioritize facility maintenance over expansion (Kahn and Levinson 2011), and that enhance transportation access for disadvantaged communities (Karner and London 2014).

Allocate State Revenues to Incentivize Sustainable Locals Sales Tax Measure Programs

State-level changes to transportation revenue allocation present an opportunity to nudge local government transportation expenditures as well. Cities and counties have wide latitude in crafting the expenditure plans supported by local sales tax measures, and grandfathered measure-funded transportation projects are excluded from regional assessments of GHG emissions. The state statute authorizing local sales tax adoption could strategically require a portion of resulting revenues to support GHG-reducing transport projects and could lower the voter approval threshold for tax measures with climate-friendly expenditure plans. Allocations of state revenue could also favor jurisdictions that abandon grandfathered measure projects that would slow achievement of regional GHG targets.

This paper has used a sustainability lens to examine the current practice for allocating state transportation revenue in California. It concludes that the state's framework for distributing revenue for transportation investment better reflects historical political deals than present climate policy and GHG reduction targets. It also suggests ways the state could more closely align its transportation funding allocation practices with transportation sustainability.

The lessons presented here extend to other states that would embed sustainability principles into their transportation activities. Like California, a number of other states have taken steps to integrate climate action and GHG reduction into transportation planning and project development.

At least 20 states—from Washington to Arizona to New Jersey—have adopted multisector GHG reduction goals.⁴ Further, some have adopted legislation or guidance integrating GHG analysis into transportation planning or project-level environmental review (Batac, Schattanek, and Meyer, 2012; Kenney *et al.* 2014). Meanwhile, some MPOs, like those serving the Atlanta, Boston, Denver, Miami-Dade, and the Washington, D.C. metro regions, have begun to establish their own GHG targets, to use GHG analysis in planning, or to plan for adapting infrastructure to climate impacts like increased flooding.

What almost no state has done, however, is connect the allocation of state transportation dollars to climate action. There is little evidence that state policymakers even consider whether the framework currently used to distribute transportation dollars in fact reflects climate considerations or goals.

Meanwhile, waning federal support for transportation and diminishing state motor fuel excise tax returns has driven California and other states to revisit how they generate state transportation revenue. The U.S. Congress has not increased the federal motor fuel tax rate since 1993 and has begun relying on U.S. general fund revenue and budgetary shuffles to keep the Highway Trust Fund solvent (Congressional Budget Office 2016; U.S. Government Accountability Office 2015). Consequently, between 2012 and 2015, 23 American states passed legislation to increase their own state transportation revenues. While some also revised policies governing distribution of those revenues, most left in place the same distributional frameworks inherited over decades (Transportation for America 2017, McAndrew 2016).

In late 2017, California itself completed a two-year study of a potential transition to distance-based fees to pay for transportation (California State Transportation Agency 2017). If the state were to replace fuel excise and sales taxes with road charges as the principal source transportation revenue, how should revenue from those charges be allocated? Should California other states and simply repeat the existing distributional pattern?

Altering the distributional framework for transportation revenues to align it with sustainability goals on one hand will introduce uncertainty. Such a shift would inevitably change the set of claimants to state revenues and the amounts they receive. It would require slow, purposeful policy and delicate politics.

On the other hand, we argue that California—or any other states also recasting transportation revenues—would squander a valuable opportunity if they continue to rely on outdated formulae. Failing to consider GHG emissions when annually allocating billions in state transportation resources threatens to sustain the very patterns of car dependence and associated climate impacts that California would reverse. By moving instead to gradually but definitively reshape resource allocation to advance transportation sustainability, California and other states will, we believe, better serve society, the environment, and the economy in the 21st century.

⁴ The 20 states with GHG emissions goals are Arizona, California, Colorado, Connecticut, Florida, Hawaii, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, and Washington. Center for Climate and Energy Solutions, <http://www.c2es.org/us-states-regions/policy-maps/emissions-targets>.

References

- Assembly Committee on Transportation. 2008. *Bill Analysis AB 1904—Transportation Programming: County Shares*. Sacramento, CA. Retrieved from ftp://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1901-1950/ab_1904_cfa_20080417_131852_asm_comm.html.
- Batac, T., G. Schattaneck, and M. D. Meyer. 2012. NCHRP 08–36, *Task 107: Synthesis of State DOT and MPO Planning and Analysis Strategies to Reduce Greenhouse Gas Emissions*. Retrieved from San Francisco, CA: [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36\(107\)_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP08-36(107)_FR.pdf).
- Booz Allen Hamilton. 2014. *Sustainability as an Organizing Principle for Transportation Agencies* (NCHRP Report 750, Volume 4). Retrieved from Washington, D.C.: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_750v4.pdf.
- Brown, A., M. Garrett, and M. Wachs. 2016. *The California Fuel Tax Swap*. Retrieved from Berkeley, CA: <http://escholarship.org/uc/item/7877815v>.
- Buehler, R., and J. Pucher. 2012. “Cycling to Work in 90 Large American Cities: New Evidence on the Role of Bike Paths and Lanes.” *Transportation* 39 (2): 409.
- California Air Resources Board. 2017. California Greenhouse Gas Emission Inventory: 2000–2015. Retrieved from https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2015/ghg_inventory_trends_00-15.pdf.
- . 2016. *Mobile Source Strategy*. Retrieved from <https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrc.pdf>.
- . 2018. *SB 375 Regional Greenhouse Gas Reduction Targets*. Retrieved from <https://www.arb.ca.gov/cc/sb375/finaltargets2018.pdf>.
- Calif. Exec. Order No. S-3-05. June 1, 2005. <http://gov.ca.gov/news.php?id=1861>.
- Calif. Exec. Order No. B-30-15. April 29, 2015. <http://gov.ca.gov/news.php?id=18938>.
- California State Transportation Agency. 2017. *California Road Charge Pilot Program: Final Report*. Sacramento, CA. Retrieved from http://www.dot.ca.gov/road_charge/resources/final-report/docs/final.pdf.
- Campbell, S. 1996. “Green Cities, Growing Cities, Just Cities? Urban Planning and the Contradictions of Sustainable Development.” *Journal of the American Planning Association* 62 (3): 296–312.
- Cervero, R. 2003. “Road Expansion, Urban Growth, and Induced Travel: A Path Analysis.” *Journal of the American Planning Association* 69 (2): 145–63.
- Chen, P., and W. Rehman. 2015. “Gas Tax Overview—Presentation to the Streets and Freeways Subcommittee. Los Angeles County Metropolitan Transportation Authority. Retrieved from https://media.metro.net/about_us/committees/sfs/images/sfs_presentation_2015_0416_gastax.pdf.
- Congressional Budget Office. 2016. *Approaches to Make Federal Highway Spending More Productive*. Washington, D.C. Retrieved from https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/50150-Federal_Highway_Spending-OneCol.pdf.
- Dill, J. and T. Carr. 2003. “Bicycle Commuting and Facilities in Major US Cities: If You Build Them, Commuters Will Use Them.” *Transportation Research Record: Journal of the Transportation Research Board* (1828): 116–23.
- Dougherty, M. 2015. *Sustainability Policy*. Sacramento, CA Retrieved from http://www.dot.ca.gov/hq/sustainability/dp_33.pdf.

- Elkind, E. 2011. "Moving Dollars: Aligning Transportation Spending with California's Environmental Goals." Berkeley: Center for Law, Energy & the Environment Publications. Paper 15.
- Elkington, J. 1997. "Cannibals with Forks: The Triple Bottom Line of 21st Century Business." Oxford: Capstone Publishing Ltd.
- Ewing, R., and R. Cervero. 2010. "Travel and the Built Environment." *Journal of the American Planning Association* 76 (3): 265–94.
- Federal Highway Administration & U.S. Dept. of Transportation. 2016. *National Performance Management Measures*. (Docket No. FHWA-2013-0054, RIN 2125-AF54). Washington, D.C.: Federal Register. Retrieved from https://www.fhwa.dot.gov/tpm/rule/pm3_nprm.pdf.
- Federal Highway Administration (FHWA), U.S. Department of Transportation. January 18, 2017. "National Performance Management Measures; Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality Improvement Program" (23 CFR Part 490). *Federal Register* 82: 5970–6050.
- Giordano, R. D. 2007. *Statutory Policy and Financing from 1977 through 2006: Thirty Years of California Transportation Legislation*. University of California, Davis.
- Goldman, T., and M. Wachs. 2003. "A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes." *Transportation Quarterly* 57 (1): 19–32.
- Handy, S. 1996. "Understanding the Link between Urban Form and Nonwork Travel Behavior." *Journal of Planning Education and Research* 15(3): 183–98.
- Kahn, M. E., and D. M. Levinson. 2011. "Fix It First, Expand It Second, Reward It Third: A New Strategy for America's Highways." *The Hamilton Project Update, 2011–03*. Retrieved from http://www.hamiltonproject.org/assets/legacy/files/downloads_and_links/Final_KAHNDiscussPaper_Feb2011.pdf.
- Karner, A., and J. London. 2014. "Rural Communities and Transportation Equity in California's San Joaquin Valley." *Transportation Research Record: Journal of the Transportation Research Board*, 2542, 90–97. doi:10.3141/2452-11.
- Kenney, M., M. Castro, T. Ramani, J. Zietsman, C. Bhat, R. Farzaneh, and S. Narayanamoorthy. 2014. *Incorporating Greenhouse Gas (GHG) Emissions in Long Range Transportation Planning*. Retrieved from Austin, TX: <http://tti.tamu.edu/documents/0-6696-1.pdf>.
- Mikesell, J. L. 2010. *Fiscal Administration: Analysis and Applications for the Public Sector* (8th ed.). Boston, MA: Wadsworth Cengage Learning.
- Mitchell, R. B., and C. Rapkin C. 1954. *Urban Traffic: A Function of Land Use*. New York: Columbia University Press.
- Mitchell, R., and C. Rapkin. 1954. *Urban Traffic: A Function of Land Use*. New York: Columbia University Press.
- McAndrew, J. 2016. *Twelve Innovations in Transportation Policy States Should Consider in 2016*. Washington, D.C.: Transportation for America. Retrieved from <http://t4america.org/wp-content/uploads/2016/01/12-State-Policies-for-2016.pdf>.
- Mikesell, J. 2011. *Fiscal Administration: Analysis and Applications for the Public Sector*, 8th edition. Harcourt Brace.
- National Cooperative Highway Research Program. 2014. *A Long-Term View of Sustainability*. Retrieved from Washington, D.C.: www.trb.org/CRP/NCHRP/NCHRPImpacts.asp.
- Rose, E. 2011. *Leveraging a New Law: Reducing Greenhouse Gas Emissions under Senate Bill 375*. Retrieved from Berkeley: <http://www.crec.berkeley.edu/Leveraging%20a%20New%20Law.Pdf>.

- Schank, J., and N. Rudnick-Thorpe. 2011. "End of the Highway Trust Fund?" *TRR*, No. 2221, pp. 1–9.
- Sciara, G.-C. 2017. "Metropolitan Transportation Planning: Lessons from the Past, Institutions for the Future." *Journal of the American Planning Association* 83 (3): 262–76. doi:10.1080/01944363.2017.1322526.
- State Smart Transportation Initiative. 2014. The California Department of Transportation: SSTI Assessment and Recommendations. Retrieved from <http://www.dot.ca.gov/CIP/docs/SSTIRReport.pdf>.
- Taylor, B. D. 1992. *When Finance Leads Planning: The Influence of Public Finance on Transportation Planning and Policy in California*. (PhD), University of California, Los Angeles: Los Angeles.
- Taylor, M. 2017. *Overview of the 2017 Transportation Funding Package*. Retrieved from Sacramento, CA: <http://www.lao.ca.gov/Publications/Report/3688>.
- Transportation for America. 2017. State Transportation Policy and Funding. Retrieved from <http://t4america.org/maps-tools/state-policy-funding/>.
- United States Environmental Protection Agency. 2018. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2016*. Washington, D.C. Retrieved from <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>.
- U.S. Government Accountability Office. 2015. *High Risk Series: An Update* (GAO-15-290). Washington, D.C.: Retrieved from <http://www.gao.gov/assets/670/668415.pdf>.
- World Commission on Environment and Development. 1987. *Our Common Future*. Retrieved from <http://www.un-documents.net/ocf-ov.htm#I>.