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Views from the Street

Linking Transportation and Land Use

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Louise Bedsworth, Ellen Hanak, and Elizabeth Stryjewski

with research support from Davin Reed, Eliot Rose, and Maggie Witt

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Summary

With the adoption of Senate Bill (SB) 375 in late 2008, California plans to reverse the decades-long upward trend in per capita vehicle miles traveled in order to reduce greenhouse gas (GHG) emissions. Since the law's adoption, analysts have expended considerable effort to assess the technical capabilities and emission reduction potential of the state's Metropolitan Planning Organizations (MPOs)—the regional transportation planning agencies responsible for meeting emission-reduction goals. Much less is known about the capabilities and potential of cities and counties—the state's primary land use authorities and important partners in the implementation of SB 375.

To gain a better understanding of the activities under way locally and the potential that localities see for reducing driving—a major behavioral shift for California residents—we conducted a survey of California's city and county planning departments. Sixty-five percent of all jurisdictions completed the survey, representing 73 percent of the state's population. The survey covered the three main strategies for reducing driving: land use policies, investments in transit and other alternatives, and pricing policies that increase the cost of road use and parking. We also conducted interviews with local and regional planners to complement the survey responses.

The responses provide some grounds for optimism regarding the implementation of SB 375, but also some warning signs. Local governments continue to focus attention on climate change, despite the recent recession, and are implementing numerous "smart-growth" land use strategies to reduce dependence on automobiles. Transportation spending has focused on transit capacity expansion since the 1970s and continues to this day. Nearly every locality has bus service, and rail transit is now available in many of the most populous jurisdictions. However, transit ridership remains low, accounting for only 5.5 percent of all commuting trips. Road pricing is gaining ground in the largest regions, which are expanding high occupancy toll lanes. But an important set of local pricing tools—parking fees and curtailing requirements to provide employee parking—are not widely used. And state and federal fees—including the gas tax and mileage charges using electronic toll collection technology—have not made headway, despite evidence that pricing is the single most important tool for changing driving behaviors. State and federal gas taxes have remained constant, in nominal terms, since the early 1990s.

Generally, local planners believe that using a combination of approaches is the most effective way to reduce driving, a view consistent with research findings that integrated policies have the greatest potential for success. Local officials also believe that the approaches they are already using are most likely to succeed, even though they are confronted by a variety of barriers, including public opposition to denser development. Planners in localities served by rail are more optimistic about all of the available options—highlighting the potential of rail to serve as a platform for integration with other strategies. However, most planners are divided in their opinions of pricing strategies. Consistent with the research, they ranked higher gasoline prices as the option with the greatest potential. But they gave low scores to all of the other pricing tools (toll and carpool lanes, parking charges, and car insurance), likely reflecting the political difficulties of implementing such strategies, given local opposition. Various local characteristics, including population size, income, and party affiliation, also affect planners' perspectives.

Note to Readers

Many of the findings in this report are summarized in *Driving Change: Reducing Vehicle Miles Traveled in California* (Bedsworth, Hanak, and Kolko 2011). That report also draws on a companion paper, "Making the Most of Transit" (Kolko 2011), which looks at trends in transit usage and residential and employment density around transit stations. All three reports are available on PPIC's website (www.ppic.org).

Contents

Technical appendices to this paper are available on the PPIC website:
www.ppic.org/content/pubs/other/211LBR_appendix.pdf

Figures

Tables

Acronyms

AB	Assembly Bill
APS	Alternative Planning Strategy
AMBAG	Association of Monterey Bay Area Governments
BART	Bay Area Rapid Transit
BCAG	Butte County Association of Governments
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CO_2-eq	Carbon Dioxide Equivalent
COFCOG	County of Fresno Council of Governments
GHG	Greenhouse Gas
GWP	Global Warming Potential
HD	High Density
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
KCAG	Kings County Association of Governments
KCOG	Kern Council of Governments
MCAG	Merced County Association of Governments
MCTC	Madera County Transportation Commission
MMT	Million Metric Tons
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission (San Francisco Bay Area)
RTAC	Regional Targets Advisory Committee
RTP	Regional Transportation Plan
SACOG	Sacramento Area Council of Governments
SANDAG	San Diego Association of Governments
SB	Senate Bill
SBCAG	Santa Barbara County Association of Governments
SCAG	Southern California Association of Governments
SCRTPA	Shasta County Regional Transportation Planning Authority
SCS	Sustainable Communities Strategy

SJCOG	San Joaquin Council of Governments
SJV	San Joaquin Valley
SLOCOG	San Luis Obispo Council of Governments
StanCOG	Stanislaus Council of Governments
TCAG	Tulare County Association of Governments
TOD	Transit-Oriented Development
UGB	Urban Growth Boundary
VMT	Vehicle Miles Traveled

Introduction

California has a long history of success in reducing air pollution associated with on-road vehicles (Bedsworth and Taylor, 2007). In its efforts to reduce greenhouse gas (GHG) emissions and mitigate the effects of global warming, the state is once again looking for significant contributions from the transportation sector. Building upon its new regulations to improve vehicle fuel efficiency and encourage the use of low-carbon fuels, California recently became one of the first states in the nation to set a goal for reducing driving—or vehicle miles travelled (VMT)—to limit GHG emissions.[1]

Senate Bill (SB) 375, signed into law in 2008, directs the California Air Resources Board (CARB) to establish GHG emission reduction targets for the passenger vehicle sector in each of the state's 18 metropolitan planning organizations (MPOs; Figure 1). MPOs are regional agencies responsible for developing long-term Regional Transportation Plans (RTPs) that coordinate local, state, and federal transportation investments. Under SB 375, each RTP should demonstrate compliance with the regional GHG emission reduction target.

CARB recently announced the first set of regional targets for 2020 and 2035.[2] For the MPOs in the state's major metropolitan areas, the targets call for reductions in per capita GHG emissions from passenger vehicles, relative to baseline conditions, on the order of 7 to 8 percent by 2020 and 13 to 16 percent by 2035 (Table 1). Although some of these reductions can be achieved through improvements in traffic flow (which improve gas mileage), most will need to come from reductions in the length and frequency of car trips.[3] The MPOs are responsible for demonstrating compliance with SB 375, but the process is designed to encourage collaboration with cities and counties—the local governments with authority over land use decisions in California. Rather than sanctions for noncompliance, SB 375 includes regulatory incentives to encourage local governments to collaborate with MPOs by easing requirements for the environmental review of suitable development projects under the California Environmental Quality Act (CEQA).

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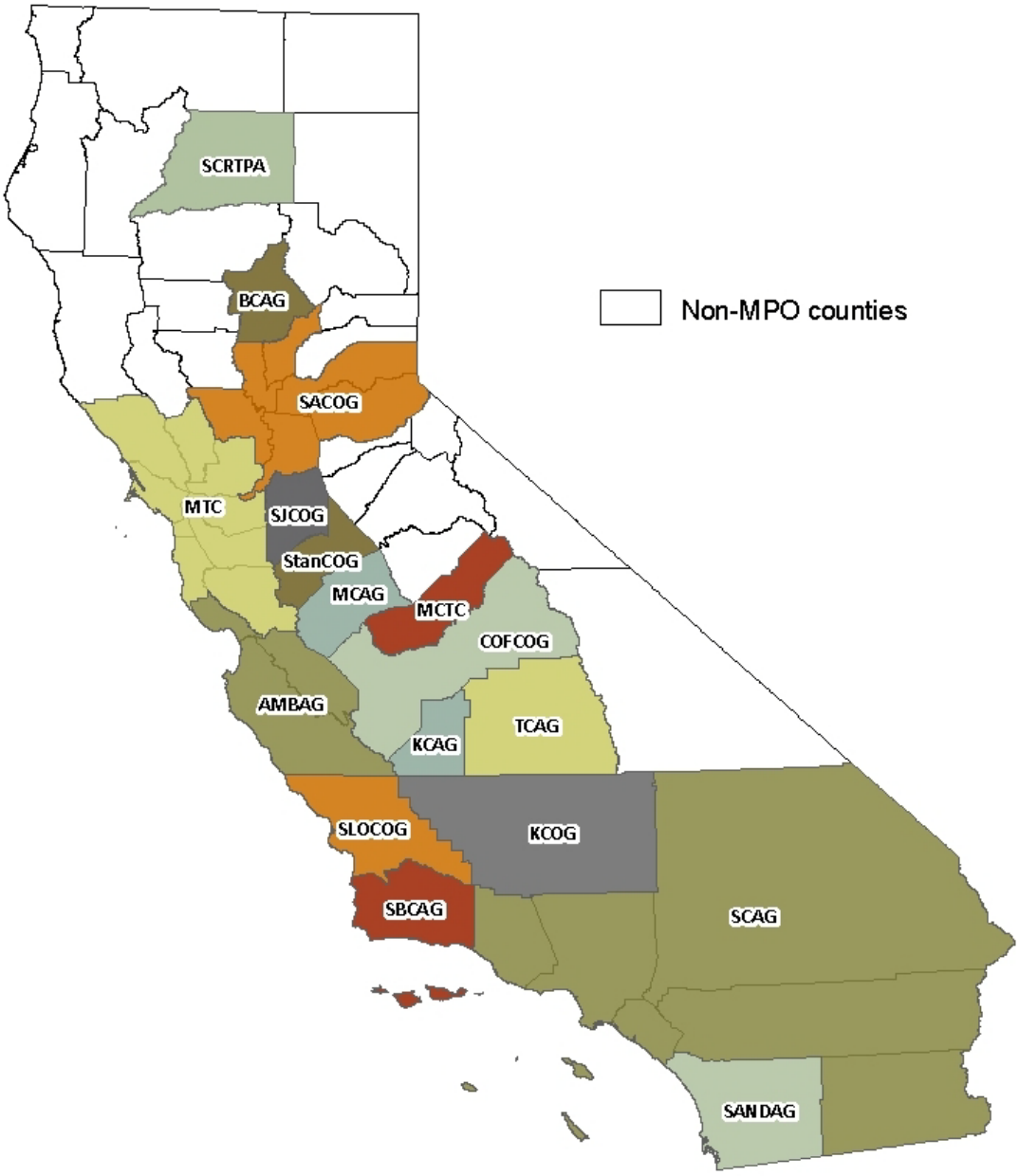
[1] In summer 2008, the state of Washington adopted ambitious per capita VMT reduction targets as part of its climate change legislation (http://apps.leg.wa.gov/documents/billdocs/2007-08/Pdf/Bills/Session%20Law%202008/2815-S2.SL.pdf). Several East Coast states have also adopted explicit VMT reduction goals as part of their climate change policies (www.georgetownclimate.org/transportation/files/TCI-SummaryofPolicyOptionsinClimateAction.PDF). The American Council for an Energy-Efficient Economy identifies California and Washington as leaders in this area (www.aceee.org/sector/state-policy/transportation-system-efficiency)

[2] CARB will update the targets every four to eight years.

[3] Technically, SB 375 calls for the reduction in emissions from passenger vehicle use above and beyond those gains expected to be achieved through improvements in vehicle fuel efficiency and the use of low-carbon fuels as required by other regulations (described later in this report). Transportation and land use policies that reduce driving receive the primary focus. To provide flexibility to the regions, "the targets can be achieved through any combination of land use patterns, transportation system improvements, and transportation-related measures or policies developed at the local and regional level" (California Air Resources Board 2010a, p. 4). In the "most ambitious scenarios" for meeting the regional 2035 targets under SB 375, transportation system improvements (including measures to improve traffic flow as well as some demand management measures we consider under "pricing," such as carpool programs) are expected to achieve 8 to 17 percent of regional GHG emission reductions in the Bay Area, Southern California, and Sacramento regions. San Diego examined one scenario in which these measures could achieve over half of the total GHG emission goal (Heminger et al. 2010).

FIGURE 1
California's MPOs cover the state's most populous counties



NOTE: MPOs include the Association of Monterey Bay Area Governemnts (AMBAG), Butte County Association of Governments (BCAG), Council of Fresno County Governments (COFCOG), Kings County Association of Governments (KCAG), Kern Council of Governments (KCOG), Merced County Association of Governments (MCAG), Madera County Transportation Commission (MCTC), Metropolitan Transportation Commission (MTC), Sacramento Area Council of Governments (SACOG), San Diego Association of Governments (SANDAG), San Joaquin Council of Governments (SJCOG), San Luis Obispo Council of Governments (SLOCOG), Santa Barbara County Association of Governments (SBCAG), Shasta County Regional Transportation Planning Agency (SCRTPA), Southern California Association of Governments (SCAG), Stanislaus Council of Governments (StanCOG), Tulare County Association of Governments (TCAG). For a list of counties belonging to each MPO, see Appendix B. California's 18th MPO, the Tahoe Regional Planning Agency (not shown here) covers portions of counties in California and Nevada surrounding Lake Tahoe.

TABLE 1
CARB has established regional per capita GHG emission reduction targets for passenger vehicles

Region	Emission reductions (%)		Population	
	2020	2035	2005	Increase by 2035 (%)
Southern California (SCAG)	-8	-13	17,763,285	33
SF Bay Area (MTC)	-7	-15	7,094,823	28
San Diego (SANDAG)	-7	-13	3,034,388	31
Sacramento Area (SACOG)	-7	-16	2,057,200	50
San Joaquin Valley (8 MPOs)	-5	-10	3,750,755	67
Other MPOs	-7 to +13	-10 to +14	1,850,698	29

SOURCE: California Air Resources Board (2010a) and California Department of Finance (2007, 2009).

NOTES: Emission reductions are expressed as a change from 2005 levels. For a list of counties in each region, see Appendix A. Population estimates are from the MPOs. Population in the 21 rural counties not included in MPOs was 837,977 in 2005, with projected growth of 39 percent by 2035 (California Department of Finance 2007, 2009). The targets for the San Joaquin Valley MPOs are placeholders, to be reviewed in 2012 prior to the development of the region's first RTPs under the new law. The targets for the "Other MPOs" group were set at business-as-usual levels. CARB plans to revisit these targets as implementation progresses.

As a climate policy tool, SB 375 is expected to achieve only modest benefits—in the near-term, 8 percent of all GHG emissions reductions in the transportation sector, and less than 3 percent of all emissions reductions economy-wide (California Air Resources Board 2008). SB 375 is thus but one of many discrete policies in California's overall strategy for reducing GHG emissions. Yet by reducing the distances between residences, workplaces, and other destinations, enhancing "walkability," and reducing the amount of time people need to spend in cars, SB 375 is expected to also meet the broader social goal of building more livable, healthy communities.[4] In addition, by facilitating the development of denser communities, SB 375 may help meet other sustainability goals with GHG emission benefits, including reducing energy and water use.

To achieve these goals, the new law implies some potentially important shifts in the way California makes transportation and land use decisions. The central goals of transportation planning have long been to improve mobility while managing the negative environmental effects of vehicle use. Over time, three types of tools have been used to foster these goals by taking the pressure off roadways: (1) more conscious efforts to integrate land use and transportation planning (e.g., transit-oriented development); (2) more emphasis on transit, bicycle, and pedestrian alternatives; and (3) the use of pricing incentives to manage traffic and reduce solo driving. While all three tools have been used to some degree, meeting SB 375 targets will require using them more aggressively than in the past.

In the first stages of implementing the new law, the state has invested considerable time and effort in assessing the technical capabilities of the MPOs to meet the new requirements. A Regional Targets Advisory

[4] To foster this connection, the state's Strategic Growth Council (created in a companion bill to SB 375) is providing grants to fund planning for SB 375, thereby recognizing the potential benefits of SB 375 for public health, conservation, livability, and other elements of healthy communities (Planning Grants and Incentives Management Team 2010).

Committee (RTAC) was established to assess the MPOs' technical readiness to conduct the necessary analysis underpinning VMT targets and to offer recommendations with regard to the design of the targets (Regional Targets Advisory Committee, 2009). CARB has also received considerable input from the MPOs themselves regarding the feasible magnitude of emission reductions.

However, there has not been an analogous assessment of local governments' readiness to implement SB 375. Previous work indicates that California's local governments have been quite active in addressing climate change, but this analysis did not closely examine local transportation and land use planning activities (Hanak et al. 2008).

This paper addresses this gap by looking more closely at local land use and transportation policies and programs and how city and county planners view a variety of tools for reducing VMT in their localities. We examine each of the three primary policy areas for reducing VMT: land use planning, investment in alternative modes of transportation, and increasing the cost of driving.

Our primary source of information is an original survey that we sent to planning directors in each of California's 57 counties and 481 cities in the spring of 2010, prior to CARB's announcement of draft VMT targets in June 2010.[5] We received completed survey responses from 349 localities, covering 65 percent of all jurisdictions and 73 percent of the state's population, for a broadly representative sample of the state as a whole.[6] We complemented the survey with in-depth interviews with over two dozen city and county officials and with regional transportation planners in the state's main metropolitan areas. We also reviewed transportation sector data from federal, state, and regional sources.

Understanding which actions are in place or planned at the local level and how local governments view the potential to respond to the challenge of reducing driving is an important piece of the SB 375 policy puzzle, given the central role of local governments in the successful implementation of the new law. This detailed baseline information will also provide a basis for tracking progress over time and facilitate an exchange of information among policymakers at the local, regional, and state levels.

In the following section, we review the policy context for the implementation of SB 375, including the respective roles of transportation agencies and local governments. We then look at the three broad types of policy tools available to reduce VMT, exploring what is currently in place and what is planned in California. We provide an overview of what the research literature has found with regard to the potential of these tools when used alone and in combination through integrated planning approaches. And we then examine local planners' views of their community's potential ability to reduce driving, focusing on the role of the various local tools and characteristics associated with a higher likelihood of success. We conclude the paper with an overview of our key findings.

Several appendices to this report provide more details on the survey. Appendix A describes the survey methodology and sample characteristics. Appendix B provides answers to survey questions for major MPO groups, non-MPO counties and the state as a whole. Appendix C provides details on the statistical analysis conducted to assess which types of localities are most likely to adopt VMT-related policy tools and which tools are most likely to be ranked highly in terms of the potential to reduce VMT. In this report, we summarize survey results in two ways: as a share of all jurisdictions responding to the survey, and as a share

[5] The City and County of San Francisco is a single geographical unit and, in this analysis, we include it with the cities.
[6] In the case of counties, we only count the population in the unincorporated areas, over which county governments have land use authority.

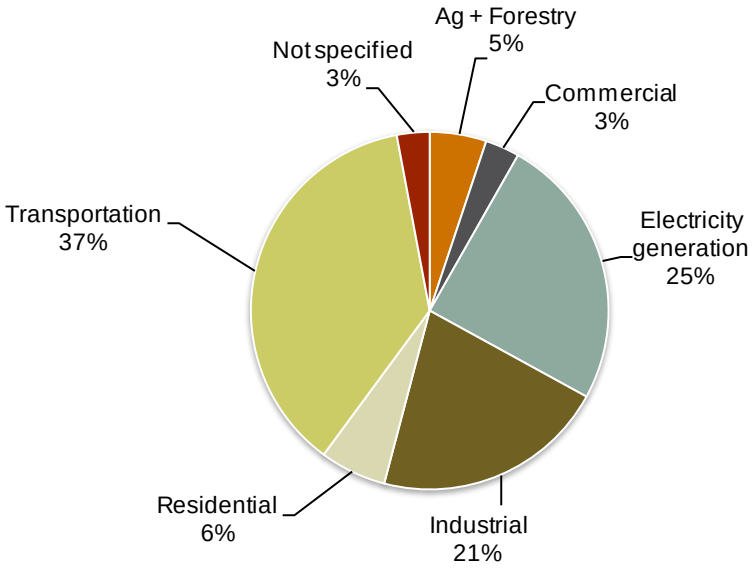
of the population represented by responding jurisdictions. The latter provides an indication of whether larger localities exhibit different patterns of behavior relative to jurisdictions on average. In addition to population, the statistical analysis also considers a range of other factors related to local resources, geographic and economic conditions, ideology, and the availability of land use, transit, and pricing tools that can reduce VMT.

Climate Change Policy and Regional and Local Governments

California's Climate Change Policy

The transportation sector is the largest source of GHG emissions in California, accounting for 37 percent of emissions in 2008 (Figure 2). Nearly three-quarters of these emissions are generated by cars and light-duty trucks—most of which are passenger vehicles.[7]

FIGURE 2
Transportation is the largest source of GHG emissions in California



SOURCE: California Air Resources Board (2010b).

NOTE: The figure shows emissions for 2008.

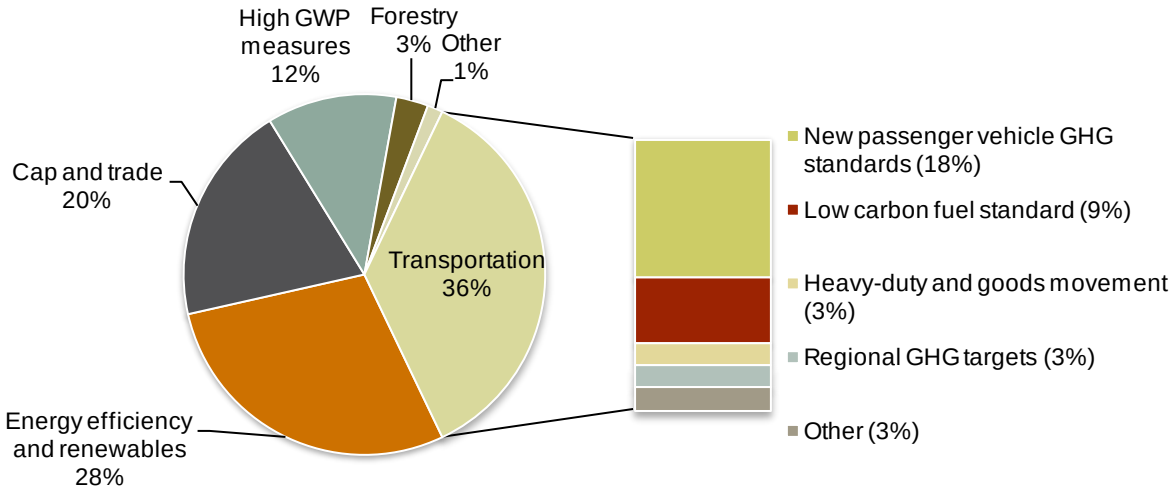
California has established aggressive goals to reduce GHG emissions that contribute to global warming. In 2005, Governor Schwarzenegger signed Executive Order S-3-05, setting a goal of reducing emissions to 1990 levels by 2020 (roughly a 30 percent reduction relative to business as usual) and 80 percent below 1990 levels by 2050—the level considered necessary globally to stabilize the climate. The 2020 goal was codified into law through the Global Warming Solutions Act of 2006 (Assembly Bill 32), which placed responsibility for developing an emission reduction plan with CARB.

CARB has outlined a comprehensive "scoping plan" outlining all the programs that will be put in place to achieve the state's 2020 emission reduction target (California Air Resources Board 2008). In all, California will need to reduce statewide GHG emissions by 174 million metric tons (MMT) of carbon dioxide-equivalent (CO_2-eq). The largest share of these reductions (36%) is expected to come from programs that affect the transportation sector, through a combination of strategies: implementing GHG emission standards for new passenger vehicles, reducing the carbon content of fuels, and reducing the number of miles driven

[7] For example, "light-duty trucks" includes sport utility vehicles.

(Figure 3). VMT reductions are included in the "regional GHG targets" established under SB 375 and depicted in Figure 3.

FIGURE 3
The largest share of emission reductions is expected to come from the transportation sector



SOURCE: California Air Resources Board (2008).

NOTE: Figure shows the share of emission reductions by target area for 2020, as presented in the AB 32 Scoping Plan. The GWP segment in the figure represents reductions in materials with "global warming potential" (refrigerants, some solvents, and other industrial gases). Within the transportation sector, "Other" includes measures to improve vehicle design and accessories (air conditioners, paint, and windows) and high-speed rail.

Within transportation, the first two prongs of the strategy rely on new technologies for vehicles and fuels, and they are expected to account for a large proportion of the near-term reductions in emissions.[8] The regional GHG emission targets established under SB 375 address the third prong of the strategy—reducing miles driven. VMT reductions play a relatively modest role in the overall emissions reduction plan—8 percent of all transportation sector reductions and only 3 percent of AB 32's overall target for 2020—anticipating the length of time needed to register cumulative effects from measures such as land use changes and new transit investments, which also require behavioral changes by the public. Although the types of tools available to achieve VMT reductions—land use changes, transit system improvements, and policies that make solo driving more costly relative to alternatives—are not new, there is only limited experience in applying them in a comprehensive way. [9]

[8] Half the reductions for the transportation sector will come from new GHG emission standards for passenger vehicles, which will be met primarily through improvements in fuel efficiency. Adopted in 2004, these standards will reduce emissions from new cars 30 percent by 2016. Another quarter of the savings will come from switching to fuels with a 10 percent lower carbon content. Regulations are also being developed to improve vehicle technologies and fuels for heavy-duty trucks and goods movement activities (8 percent of the total).

[9] Some have argued that greater reductions in VMT than those in CARB's scoping plan are possible (Ewing and Nelson 2008; Winkelman, Bishins, and Kooshian 2010), while others argue that VMT reduction is a costly, inefficient, uncertain GHG emission-reduction strategy (Moore, Staley, and Poole 2010). Boarnet (2010) provides a critical overview of this debate.

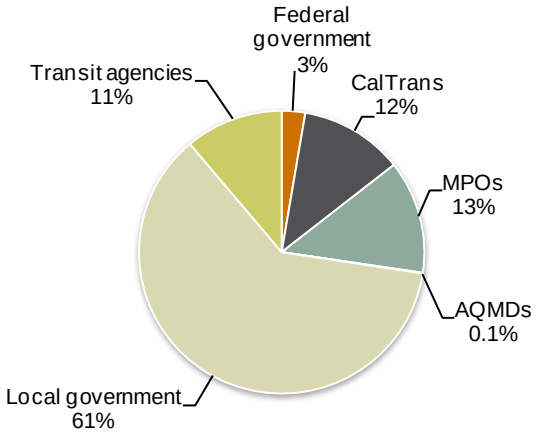
Regional Transportation Planning and SB 375

SB 375 implementation focuses on the regional transportation planning process, which is the centerpiece of statewide planning of transportation investments from federal, state, and local sources. Federal requirements apply to the state's 18 federally designated MPOs; state law applies to the MPOs and regional transportation planning associations in rural areas (California Transportation Commission 2010). Both state and federal laws require that regional transportation plans (RTPs) cover a time horizon of at least 20 years and be updated at least every four to five years. SB 375 augments the state requirements for RTPs, which must remain consistent with pre-existing federal requirements for these planning tools. SB 375 applies only to the MPOs, within whose domains the vast majority of the state's population resides.

Under state law, RTPs must describe regional transportation policy, outline short- and long-term projects to address regional transportation needs, and identify projected costs and revenues. Under federal law, RTPs must address economic, safety, and environmental considerations (23 *CFR* 450.306). To be eligible for federal funding, RTPs must also be "fiscally constrained"—meaning that all projects must have demonstrated sources of funding. In regions that do not meet federal air quality standards, the RTP must also demonstrate conformity with allowable regional air pollution emission "budgets."[10] RTPs from across the state are merged for the development of the statewide transportation plan.

The fiscal constraint is an important element of the RTP. All regions must outline planned projects and identify anticipated revenues to pay for each project. MPOs have control over only a small portion (about 13 percent) of the funds accounted for in the RTPs statewide (Figure 4).[11] Many of the spending decisions are made by county transportation agencies or predetermined by voter-approved county sales tax referenda.

FIGURE 4
Local authorities control most transportation funds



SOURCE: Authors' calculations using the most recent RTPs (through 2009).

NOTE: Transportation expenditures by type of agency. Total funds include $759 billion, covering a time horizon from the mid 2000s to the mid 2030s. The distribution between local governments and transit agencies likely understates funding for transit agencies from county sales tax measures.

[10] The emissions "budget" refers to the amount of emissions that are possible without exceeding air pollution standards.
[11] Multicounty MPOs have much less control over transportation spending than single-county MPOs, which control local sales tax revenues in addition to other sources. In one extreme case—the vast region encompassing the Southern California Association of Governments (Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura Counties)—the MPO is responsible only for planning; all investments and maintenance are carried out by subregional and local authorities.

Sustainable Communities Strategy

Under SB 375, each MPO is required to develop an SCS as part of its RTP. The strategy must identify areas capable of housing the expected population of the region as well as farmland and other land resources. Then it must outline a transportation investment plan for the region that will meet the GHG emission reduction targets established by CARB. The SCS is subject to the same fiscal and air-quality-conformity constraints as the RTP.[12]

For the first time, SB 375 aims to synchronize several planning processes that affect transportation and land use. Although the new law does not mandate that local land use policies and plans be changed to meet the targets (e.g., through a general plan revision), the requirements of the SCS make the connection between transportation planning and local land use more explicit. And to facilitate the coordination of land use and transportation under the new law, SB 375 harmonizes the timing of the planning processes for the RTP and regional housing needs allocations, under which cities and counties are required to develop and regularly update housing elements as part of their general plans. Prior to SB 375, these processes occurred on different time scales; under the new law, the timing is coordinated and the same set of assumptions will inform both processes.[13]

Early responses from the regions

The San Diego region will be the first to develop its RTP and the requisite SCS following SB 375's passage (due July 2011). But MPOs in the other major metropolitan areas have also been actively considering their ability to implement the new law. Table 2 compares the projected per capita GHG emission reductions from the transportation sector under the assumptions of the existing RTPs with the targets recently adopted by CARB for the four largest MPOs. The table highlights two important points. First, the state's largest regions were already working to reduce per capita GHG emissions associated with passenger vehicles prior to the passage of SB 375. Indeed, part of the impetus for SB 375 came from the "Regional Blueprint" planning process, which has encouraged MPOs and local governments to coordinate transportation and land use planning to meet a range of sustainability goals. The state officially launched this process in 2005, but such efforts had been occurring at some MPOs since the 1990s (Barbour and Teitz 2006).[14] For this reason, several MPO planning directors we interviewed reported that SB 375 codifies what they were already doing and provides "wind at their backs."

[12] If a region is unable to develop an SCS that meets the GHG emission reduction targets, it must develop an Alternative Planning Strategy (APS). Because the APS is not part of the RTP, it is not constrained by fiscal or air quality conformity requirements. Instead, the APS must demonstrate how the region would meet the targets in an unconstrained environment.

[13] Prior to SB 375, cities were required to update their housing element every five years, whereas most MPOs must update their RTPs every four years. SB 375 lengthens the housing element update cycle to eight years, bringing it in sync with every other RTP update.

[14] The California Department of Transportation (Caltrans) supports the Blueprint Planning process, which is designed to help regions develop sustainable long-term growth plans. See http://calblueprint.dot.ca.gov/

TABLE 2
MPOs are stepping up GHG emission reductions since the passage of SB 375

		Per capita GHG emission reductions, 2005–2035 (%)	
	Current RTP adoption date	Current RTP	New target
Southern California (SCAG)	2008	-4	-13
SF Bay Area (MTC)	2009	-3	-15
San Diego (SANDAG)	2007	-10	-13
Sacramento Area (SACOG)	2008	-13	-16

SOURCE: Heminger et al. (2010); California Air Resources Board (2010a).

NOTE:. Although SANDAG's current RTP has a time horizon of 2030, the "current RTP" estimates for 2035 were developed in collaboration with CARB and use consistent fuel price assumptions, updated economic conditions, and updated population and vehicle fleet projections. The target set by CARB for SCAG is higher than the level established by the region in its "most ambitious scenario" (12%), and the SCAG board voted in September 2010 to reject the new target (with a counterproposal of 8 percent) unless CARB accepted conditions including the restoration of state funding for transit and demonstration projects (Southern California Association of Governments 2010).

Second, the new law has pushed regions to look for further gains. The targets were informed by each region's analysis of a "most ambitious scenario" for 2035. These scenarios did not include fiscal constraints, air quality conformity, and other requirements necessary for a completed RTP, but they did involve a careful look at a range of transportation and land use policy options. Efforts are also under way in the smaller regions, although the analyses are at an earlier stage. Notably, in early 2009 the San Joaquin Valley MPOs adopted a preferred growth scenario as part of the region's Blueprint planning process, which quantifies GHG emission reductions. These counties will be working with CARB to refine their regional targets for their next RTP updates (San Joaquin Valley Blueprint Planning Process 2009).[15]

Roles and Goals of Local Government

To better understand local government actions and their perceptions of the potential to reduce GHG emissions through transportation and land use planning, we conducted a survey of city and county planning offices in the spring of 2010. The survey asked about community development considerations, general climate policies, activities, and perceived potential in three areas—land use, transit and alternatives to driving, and pricing—and barriers and coordination issues in these same areas. The responses collected from 349 localities are used in the remainder of this report to examine local government goals, actions, and perceived potential to reduce GHG emissions.

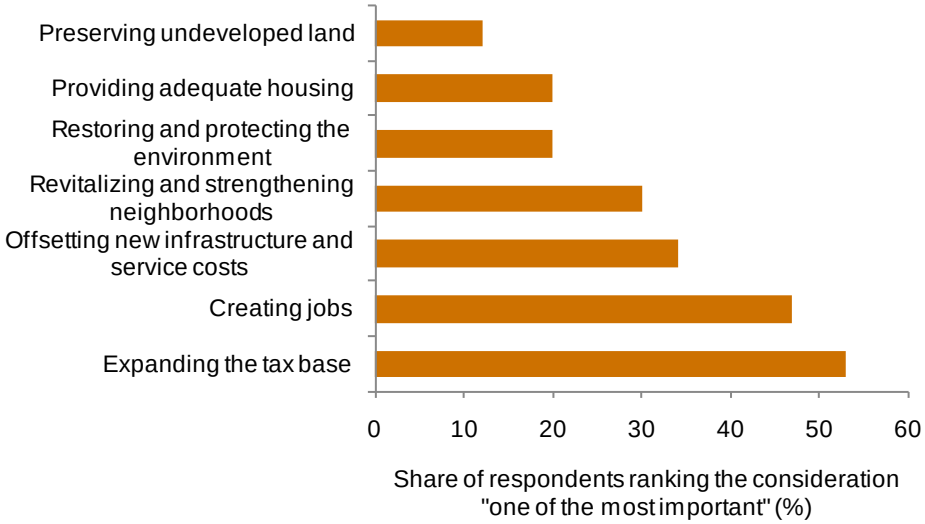
Cities and counties—the major players along with the MPOs in implementing SB 375—are multipurpose entities. All have primary responsibility for land use planning within their jurisdictions (as do county governments in the unincorporated areas of the county). Many provide a range of other public services, including local infrastructure and public facilities (streets and roads, transit, parks and open space), utilities (often water and wastewater, and occasionally energy), and economic and social services (business

[15]Some MPOs have raised questions about how to pay for the planning required for SB 375. The Strategic Growth Council, a group formed by Senate Bill 732 (a companion to SB 375) provides some funds for these planning activities. The federal government also provides some planning funds directly to the MPOs.

development, social and cultural programs).[16] Thus, local government efforts to reduce GHG emissions occur in the context of numerous policymaking goals. Survey respondents reported that economic considerations ranked among the most important in their locality's development decisions, a factor likely accentuated by the recent recession. Figure 5 shows the pattern of responses as a share of all jurisdictions that responded to our survey, as well as the surveyed population living in those jurisdictions, providing a way to see whether more populous localities emphasize different goals.[17] Roughly half of all localities considered expanding the tax base (53%) and creating jobs (47%) "one of the most important" objectives. In contrast, some social and environmental goals ranked considerably lower. Jobs were even more important for more populous localities, which also place a greater emphasis on housing.

FIGURE 5
Economic considerations are most important in local development decisions

How important are the following considerations in your city/county government's decisions on development projects?



SOURCE: Appendix Table B3.

Despite the recession and considerable local fiscal stress, California's cities and counties are continuing to play an active role in addressing climate change. In particular, increasing numbers of cities and counties are undertaking two important general activities: emission inventories and climate action plans (Table 3). Emission inventories develop a baseline of GHG emissions from different sources, enabling localities to identify areas for emission reduction efforts and to monitor progress once those goals are established. Climate action plans are general planning documents that set out strategies for emission reductions and other sustainability measures (Hanak et al. 2008). Between 2008 and 2010, the share of jurisdictions undertaking both types of efforts increased substantially, with roughly 70 percent of all localities now active.[18] The vast majority of localities active in these general areas reported that they were resulting in goals, policies, or programs to reduce VMT (appendix Table B6).

[16] These local services are also provided by special districts and investor-owned utilities in some locations.
[17] See Appendix A for a discussion of sample representativeness and weighting for population.
[18] See also the 2009 survey of local governments on these activities in the 2010 Planners' Book of Lists (Office of Planning and Research 2010).

TABLE 3
Despite the recession, local governments have been expanding their climate action programs

	2008	2010
Emission inventory – municipal operations	55%	70%
Emission inventory – community at large	42	69
Climate Action Plan	52	69

SOURCE: 2008 results from Hanak et al. (2008). 2010 results from Appendix tables B4 and B5.

NOTE: Table reports the share of jurisdictions that have completed, are in the process of completing, or are planning to develop emission inventories and climate action plans. Sample size for 2008 survey questions: 301-307. Sample size for 2010 survey questions: 337-342. This pattern of increased activity is confirmed when we examine only the localities that responded to both surveys.

What type of localities are most likely to engage in climate change activities?[19] Population size is one significant factor. Because more populous communities are more likely to be active, over 85 percent of our sample population will be covered by these tools. From an environmental planning perspective, population size is also a measure of local resources: larger localities can benefit from economies of scale in planning activities; many have their own environment staff in addition to planning departments. Higher income localities are also more likely to be active, a more general reflection of local resources. Political party affiliation also matters: Localities with a higher share of Republican voters are less likely to be engaged in these activities. These three characteristics—size, income, and party affiliation—are also commonly associated with the adoption of other environmental policies (Lubell, Feiock, and Handy 2009; Zahran et al. 2008; Gale and Hart 1992). Climate change activities are also more likely in localities that have adopted smart-growth land use tools.[20]

The positive association of size with climate action is a plus from the perspective of statewide emission reductions because larger jurisdictions cover a greater share of the population. The positive association between general climate policies and smart-growth land use tools suggests that the general policies are being backed up by concrete actions.

Indeed, although local governments have the ability to affect GHG emissions in a variety of ways, the most direct channel is through land use decisions (Hanak et al. 2008). A city or county general plan presents its long-term development vision. Zoning standards and building codes translate the general plan into specific land use regulations, including allowable uses, lot size, building height, setbacks, and requirements for parking, as well as energy and water use efficiency in buildings.[21] These decisions are important for residential and commercial energy use—an important factor in GHG emissions—and they also influence the use of transit and the length and number of car trips—key factors targeted by SB 375.

Cities and counties also influence other important factors affecting the implementation of SB 375. They have direct authority over some pricing tools, such as parking charges. Many local governments also make transportation spending decisions for local streets and transit, and all have influence over the suitability of the local network for walking and biking. Finally, the governing boards of most regional agencies, including

[19] Results in this paragraph refer to regression results reported in appendix Table C1.
[20] For a description of these tools, see the discussion of Figure 6, below. "Edge" cities—those at a greater distance from the central business district—are also less likely to be undertaking emission inventories, but not less likely to adopt Climate Action Plans. Controlling for population, localities that have lower residential densities are also more likely to adopt general climate policies, although density and population size are highly correlated. More rapidly growing localities are more likely to be adopting climate action plans (See appendix Table C1).
[21] Minimum building codes for energy, water use, and other measures are set by state law (Title 22 Energy Codes and the recently adopted California Green Building Standards Code), but municipalities are generally free to set higher standards (California Building Standards Commission 2008).

the MPO, consist of local government officials. In this sense, local government officials are the ultimate decisionmakers when it comes to regional transportation policy.

Rather than penalties for failure to comply, SB 375 contains incentives for local governments within a region to work toward reducing GHG emissions—namely, relief from regulatory review under the California Environmental Quality Act (CEQA).[22] There has been considerable debate over whether this relief is a sufficient "carrot" to encourage stepped-up local government participation. Our survey did not inquire how local officials felt about the new CEQA relief, but interviews with regional agency staff and other practitioners suggest that the perceived benefits are greater in some regions than others. Notably, the Sacramento region has viewed the potential for relief favorably and believes that it will be a sufficient incentive for localities and developers to undertake projects that are consistent with the goals of SB 375.

Other communities have expressed skepticism that these incentives will be adequate to encourage climate change activities. For example, a planner with a San Joaquin Valley MPO said that the CEQA incentives are "totally irrelevant for rural areas that do not have enough transit service for transit priority projects" eligible for CEQA relief,[23] and the "required densities are too high for most of the Valley to qualify for incentives." One southern California planner also expressed concern that transit service was inadequate to meet the requirements of transit priority projects. However, as discussed below, many local governments appear poised to participate in the development of more integrated transportation and land use planning activities that could reduce VMT, and local planners exhibit cautious optimism about the potential to achieve gains in their localities.

[22] SB 375 offers three paths to CEQA relief: (1) programmatic streamlining for certain residential projects that are consistent with a region's SCS or APS; (2) streamlining or exemption for transit priority projects that are consistent with a region's SCS or APS; and (3) adoption of a uniform set of traffic mitigation measures for high-density residential developments, which exempts these projects from further traffic mitigation requirements. Local governments may choose whether to allow projects in their jurisdiction to take advantage of the CEQA reforms offered by SB 375.
[23] A transit priority project is defined as one that is at least 50 percent residential, has a minimum density of at least 20 units per acre, and is within a half mile of a high quality transit corridor.

Programs and Policies to Reduce Driving

The three primary approaches to reduce vehicle miles traveled are: (1) changing land use and building patterns to reduce driving distances and/or the number of trips people need to drive, (2) investing in alternatives to driving, such as transit or bike and pedestrian facilities, and (3) increasing the cost of solo driving and parking relative to alternatives including carpooling and transit use.[24] In this section we examine the types of tools available in each category, the extent to which these tools are being adopted within California, and the types of VMT benefits they have been found to achieve in various settings.

Land Use Policies

Many analysts have examined the relationship between land use patterns and vehicle use. Overall, the characteristics of the built environment have been shown to have a significant effect on trip frequencies, trip length, and mode choice, although each is also affected by socioeconomic conditions (Ewing and Cervero 2001, 2010).[25]

In particular, a range of "smart-growth" strategies can reduce demand for single-occupant vehicle trips by addressing what are often referred to as the "Three Ds" of land use: density, diversity of use, and pedestrian design (Cervero and Kockleman 1997; Ewing and Cervero 2001). More compact (i.e., more dense) areas have lower per capita VMT because of lower levels of automobile use and greater use of alternative forms of transportation (Cervero and Murakami 2010; Ewing et al. 2007). Using travel diary data, Cervero and Kockleman (1997) show a small but significant effect of neighborhood density, diversity of use, and pedestrian-friendly design on trip frequency and use of alternative modes of travel. Many studies now include a fourth "D"—access to destinations—and over time, researchers have added additional "Ds," including distance from transit, demographics, development scale, and demand management (Walters and Ewing 2008). As discussed below, modeling exercises suggest that these measures are likely to be most effective in reducing VMT when integrated with transportation investments and pricing tools. [26]

Land Use Strategies in Action

Our survey inquired about the use of a range of land use tools that are part of the "smart-growth" toolbox designed to raise densities and increase proximity to transit:[27]

1. **Urban growth boundaries or greenbelts:** By restricting development outside of designated areas, these tools aim to increase density within the core urbanized area and prevent "leap-frog" development;

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[24] Other regional policies and characteristics also influence VMT and related metrics. People are more likely to walk in communities with lower crime rates (Doyle et al. 2006). Education policies that rely on a neighborhood school model rather than a district-wide school choice system can reduce car trips to get students to and from school (Marshall et al. 2010).

[25] See also the literature review in the companion paper to this study (Kolko 2011), available at www.ppic.org/main/publication.asp?i=947.

[26] Demand management reflects the use of pricing tools, discussed below.

[27] These are not the only smart-growth tools available to local governments. For instance, interconnectivity of roads and other elements of street design are also important factors influencing the attractiveness of driving versus alternative modes of travel (Ewing and Cervero 2010).

2. **Transit-oriented development (TOD):** By designating priority sites or site-specific zoning and building standards around transit nodes and hubs, these tools make special efforts to increase density in close proximity to transit in order to facilitate transit usage;

3. **Mixed-use, high-density, or infill development:** By designating priority sites or site-specific standards to encourage these types of development, these tools can facilitate fewer and shorter car trips by virtue of more diverse land uses within close proximity;

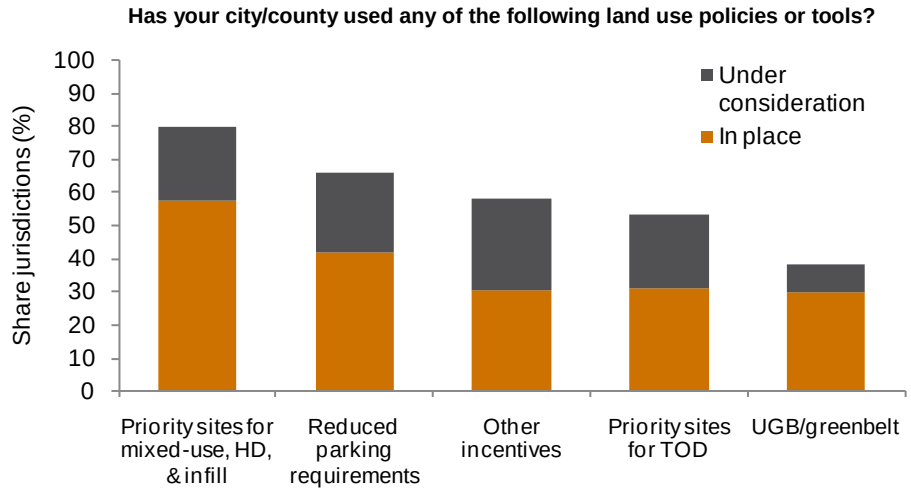
4. **Reduced parking requirements:** By reducing minimum parking requirements (the number of spaces developers must provide per unit of residential or commercial space), localities can facilitate infill and high-density development by reducing costs to developers;[28]

5. **Other incentives:** Tools such as preferential fees or permit streamlining for qualifying developments can also encourage density by reducing developer costs.

Many localities are already employing a range of these tools, and many others are considering them (Figure 6). Statewide, the designation of priority sites and site-specific standards for mixed-use, high density, or infill development is the most prevalent strategy (used in 58 percent of all localities and under consideration in another 22 percent). All of the other strategies, except urban growth boundaries, are already in use or under consideration in over half of all localities.

[28] Another parking tool is "unbundling," whereby developers sell the parking spaces separately from the residential or commercial units. This allows those who value parking most to buy it and thus facilitates providing less overall parking.

FIGURE 6
Local governments are using a variety of land use tools to increase density and improve access to transit



SOURCE: Appendix Table B7.

NOTE: HD is "high density," TOD is "transit-oriented development," and UGB is "urban growth boundary."

In general, localities with larger populations are leading the way: they have higher rates of adoption of most individual tools, and they are most likely to rely on multiple tools.[29] Another important factor is experience with smart-growth tools: For each of these policies, communities that have already adopted other land use tools are significantly more likely to have adopted or to be considering putting other policies in place. Transit-oriented development, in particular, is much more likely in communities that already have some form of rail transit (light-rail, commuter rail, subways, or streetcars) or that expect to have rail in the future.[30] In contrast, other factors—such as income levels, party affiliation, growth pressures, and existing levels of density—generally do not appear to make a systematic difference in the adoption of smart-growth land use tools.

Experience and familiarity with these tools are important factors in overcoming the most frequently mentioned obstacle to land use changes—public opposition. Local officials in our survey ranked public opposition to density highest among nine barriers to reducing driving in their communities.[31] This problem looms much larger than a range of other commonly cited obstacles to smart-growth land use, including lack of lender or developer support and problems with existing land use patterns and zoning codes. Respondents who reported success in overcoming public opposition pointed to the use of positive examples from within and outside the locality as a way to win support. For example, San Francisco used examples of existing mixed use and high-density developments to educate the public about what density looks like and how

[29] For adoption shares by population, see appendix Table B7. Statistical results reported in this paragraph are presented in appendix Table C2. Population is a significant factor for the number of land use actions adopted, and it is significant for all individual land use tools except urban growth boundaries when a measure of "other land use actions" is not included in the regression. It remains significant for TOD and other incentives even when other land use actions are included.

[30] Communities with existing or planned rail are 26 and 22 percentage points more likely to have adopted a TOD policy, respectively, than those without rail. In localities without rail, transit-oriented development tends to focus on higher density and mixed-use development along major bus corridors, or on ensuring good bus connections for retail establishments. Several Central Valley cities also mentioned the possibility of capitalizing on high-speed rail as a focal point for TOD in the future.

[31] See appendix Table B24 (j). This barrier ranked among the top three in every region but the San Joaquin Valley.

good design principles can affect development. The city of Roseville built a set of educational materials showing how diverse land uses can help build community character and maintain property values.

The already widespread use of smart-growth land use tools, particularly in the state's larger localities, may help explain why residential densities are now increasing in California. As Kolko (2011) shows, residential densities in the state increased between 1990 and 2000, a trend that appears to have continued over the first decade of the 2000s.[32] This trend stands in contrast to the nation as a whole, where average residential densities are both considerably lower and are stable or falling. However, California's employment densities are somewhat lower than the U.S. average and falling, as jobs are spreading outward from city centers. This trend, too, is consistent with reported land use policies from our survey: Among localities with existing or planned projects to increase density, projects are much more likely to emphasize residential than commercial uses.[33] Although the dispersion of jobs within metropolitan areas may be increasing the jobs-housing ratios within some suburban localities, it can pose obstacles to increasing transit use by commuters, where density is an important factor, as discussed below.

Investments in Transit and Other Alternatives to Driving

Transit serves multiple goals, including mobility and access for low-income, disabled, and elderly residents without cars. However, one key goal of transit, especially since the 1970s, has been to help reduce congestion—and its associated air pollution—on roadways during peak periods (Fielding 1995; Hanak and Barbour 2005).[34] This goal relates most closely to SB 375's call to reduce GHG emissions from passenger vehicles.

Transit Strategies in Action

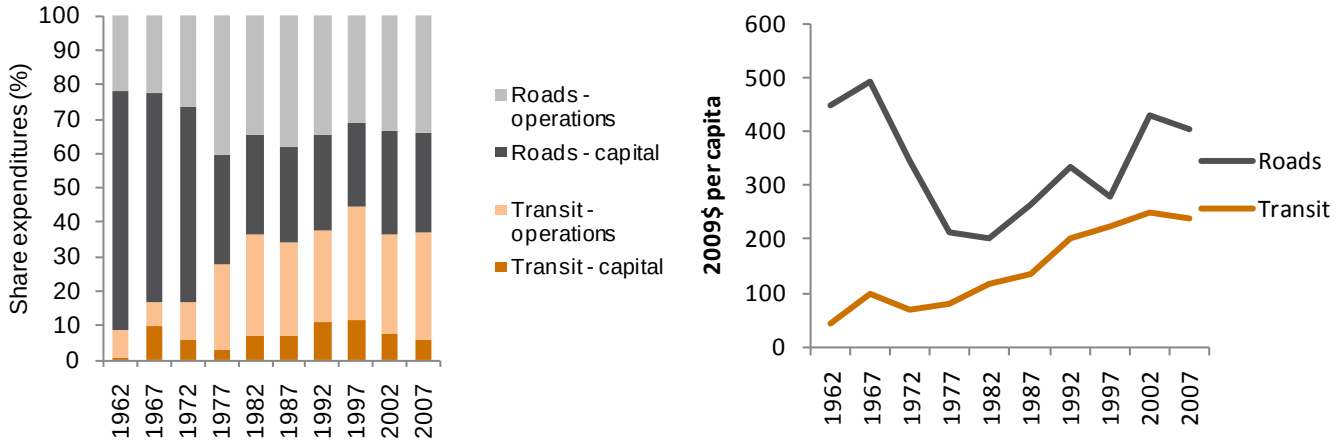
Transit has been an important component of transportation spending in California since the end of the federal freeway expansion program in the 1960s (Figure 7). Since the early 1980s, transit has accounted for over a third of all transportation spending in California, and from 20 to 30 percent of capital investments. In the four largest MPOs, the projected shares of transit expenditures over the next few decades are even higher, ranging from 40 percent of the total in the San Diego region to 65 percent in the Bay Area (Figure 8).

[32] Some increase in residential density could be occurring because of an increase in household size, a factor associated with the arrival of large immigrant populations in the 1990s and 2000s (Johnson, Moller, and Dardia 2004; Fulton et al. 2001), but housing unit density also increased in California from 1990 to 2008 (Kolko 2011). Rising land prices are also likely contributing to denser residential development, even in the absence of smart-growth land use tools.

[33] Over half (56%) of the communities with these projects reported that they were all or mostly residential, versus only about a third (31%) evenly split between residential and commercial, and 13 percent mostly commercial (appendix Table B8, with calculations excluding those without projects or responding "don't know").

[34] As a recent example, over half of the $4.9 billion committed to projects designed to reduce congestion under the state's Traffic Congestions and Relief Act of 2000 was allocated to rail and other transit projects (California Legislative Analyst's Office 2007).

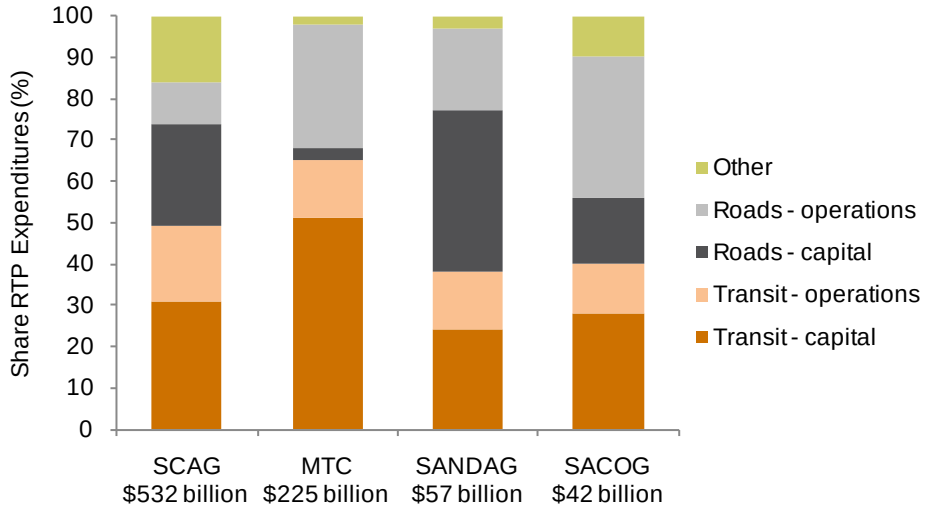
FIGURE 7
Transit became a focus of transportation spending in the 1970s



SOURCE: Census of Governments, various years

NOTE: Data are adjusted to real per capita basis using the building cost index from Engineering News Record and population data from the California Department of Finance (2009).

FIGURE 8
Transit is even more important in planned spending by the four large MPOs



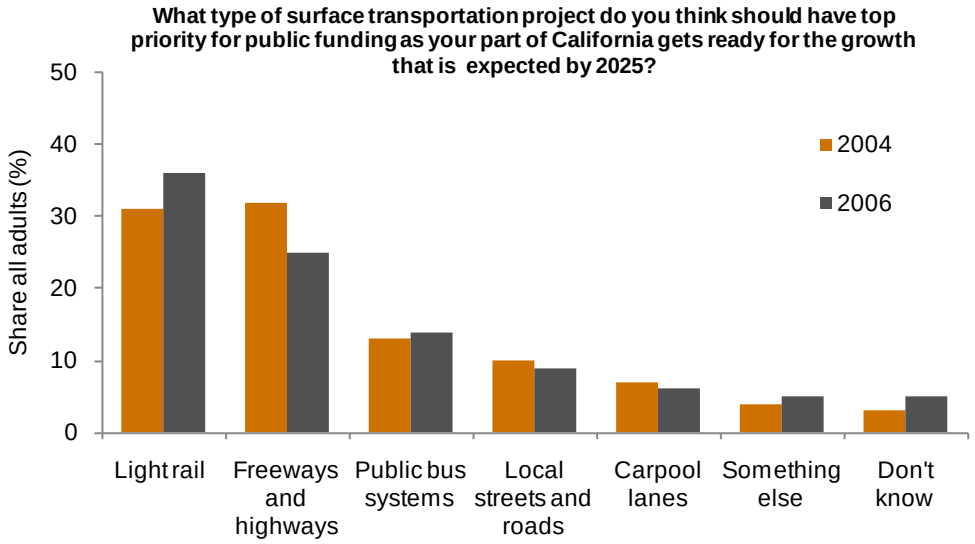
SOURCES: Expenditure data from Heminger et al.(2010). Total RTP expenditures from MPO RTP documents (MTC 2009; SACOG 2007; SANDAG 2007; SCAG 2008).

NOTE: The figure shows planned spending to 2035 within existing RTP documents, with the exception of SANDAG, which has a horizon of 2030. The "other" category includes system efficiency improvements, risk assessment, interest payments, general planning funds, and goods movement investments.

Most transit capital spending is associated with rail projects. Construction of the Bay Area Rapid Transit (BART) system in the San Francisco Bay Area was begun in the mid-1960s; San Francisco built a new underground light-rail system in the 1970s; and four large cities—San Diego, Los Angeles, San Jose, and Sacramento—opened new rail transit systems during the 1980s and 1990s. Rail expansion has continued in recent years: Between 1992 and 2006, 217 new fixed-line stations (including rail, streetcar, and bus rapid transit) opened in the state, and dozens more are planned (Hanak and Barbour 2005; Kolko 2011).

These shifts in spending appear consistent with the public's priorities. In surveys of California residents in 2004 and 2006, at least two-thirds indicated that they preferred expansion of public transit and increasing the efficiency of highway use over expansion of existing highways to meet future needs (Baldassare 2004, 2006). Generally, rail projects are more attractive to the public than other transit investments. When asked what type of surface transportation projects should be given top priority for public funding in the future, rail ranked as high or higher than highways and nearly three times as high as buses (Figure 9). Rail is often included in local sales tax measures, despite its high costs, because it is attractive to voters and can increase the likelihood of the tax measure passing (Crabbe et al. 2005; Wachs 2003).

FIGURE 9
Californians favor rail transit as a transportation investment



SOURCE: Baldassare (2004, 2006).

Although many new capital projects have focused on rail, bus service—generally a far less costly option—is much more widely available (appendix Table B12). Survey respondents reported the availability of local bus service in all but the least populous jurisdictions; nearly half of all localities also have express bus services. Just over a quarter (26%) of local governments in the survey reported the availability of some form of rail transit, and rail is planned in another 11 percent. Because the first rail projects were built in the state's most populous areas, over 60 percent of the sample population lives in localities that have rail transit stations, and that total will reach 70 percent with planned expansions. Of course, availability within a city's boundaries does not mean that these transit alternatives are within easy access of all residents and workers. Kolko (2011) estimates that only 6 percent of California residents live within a half-mile of a rail transit station, and only 12 percent of workers have jobs within a half-mile of a station. Nonetheless, as discussed below, rail availability does appear to shape planners' perspectives on the local potential to reduce VMT.

Of course, increased ridership is necessary to achieve transit's congestion management and environmental goals. To date, ridership trends for California's transit systems have been disappointing, relative to the investments made in this sector. For the state as a whole, the share of commuters taking transit increased from 5 percent to 5.5 percent between 1990 and 2008 (Table 4)—76.4 percent of all commuters still drive alone to work. Transit is much more important for commutes in the San Francisco-Oakland metropolitan

area (15.3 percent—second only to the New York City metro area nationally). Transit use is slightly higher than the state average in Los Angeles (6.6%) and much lower in other major metropolitan areas.

TABLE 4
Transit has increased only slightly as a share of commutes since 1990

	Transit share of commutes (%)			1990–2008 (%)	
	1990	2000	2008	Rail	Bus
Los Angeles-Long Beach-Santa Ana	5.7	5.8	6.6	0.5	0.4
San Francisco-Oakland	14.3	14.4	15.3	1.8	-0.8
San Diego	3.4	3.5	3.6	0.4	-0.2
Riverside-San Bernardino	0.8	1.7	1.9	0.7	0.3
Sacramento	2.4	2.8	3.0	0.2	0.3
San Jose	3.0	3.5	3.8	0.8	0.0
California	**5.0**	**5.2**	**5.5**	**0.6**	**-0.1**
U.S.	**5.3**	**4.7**	**5.2**	**0.2**	**-0.3**

SOURCE: US Census and American Community Survey.

NOTE: Change in rail and bus is a percentage point change. Transit includes rail and bus. Rail includes all rail transit (streetcar, subway, rail); Bus includes ferries, which account for less than 1 percent of the total. City names refer to metropolitan areas.

Rail still represents only a small share of overall transit commutes (1.4 percent versus 4.1 percent for buses), but it has accounted for much of the increased ridership. For example, in the San Francisco-Oakland and San Diego metropolitan areas, increased rail use actually displaced bus use, which declined as a share of all commutes.[35] Between 1990 and 2008, per capita VMT increased in California by 3.5 percent, suggesting that increased transit did not displace road travel—or at least not enough to reduce overall driving.[36] This may be due to increased automobile use for non-commute trips: Commutes account for only a fraction of all car use, and people are much less likely to use transit for non-commute trips.[37] Transit investments may also fail to reduce VMT because the reduction in road congestion encourages additional driving, as in the case of trucks moving goods (Duranton and Turner 2009). Driving in California has increased at a lower rate than in the nation overall, where per capita VMT rose by 13.7 percent over the same period.

Another challenge for the transit system is cost. Transit systems the world over rely heavily on operating subsidies. Statewide, transit fares cover only about a quarter of operating costs.[38] A recent analysis of transit systems in the Bay Area found that operating costs have been increasing much more rapidly than inflation.[39]

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[35] In a national study, Baum-Snow and Kahn (2005) find that rail investments often fail to increase overall transit ridership because many new rail transit commuters are former bus commuters, not former drivers.
[36] Data on VMT are from the Federal Highways Administration (Annual Highway Statistics, Table VM-2, 2010b).
[37] In a 2001 national survey of travel behavior, commutes accounted for 27 percent of VMT; transit was used for 3.7 percent of commute trips, 1.1 percent of trips for family or personal business, and 1 percent of trips for social or recreational purposes (Hu and Reuscher 2004, Tables 6 and 9). In California, 39 percent of trips originating from home are to work (California Department of Transportation 2003). In their assessments of the potential to reduce VMT, MPOs focus on weekday trips, without explicitly distinguishing between work and nonwork trips.
[38] Author calculations using data from the Census of Governments, 1992 –2007. Recovery rates vary across systems. For instance, at 64.5 percent, the Bay Area's BART system rate of operating cost recovery is far higher than the statewide average for transit in California. It is also one of the highest rates of recovery of any rail transit system in the country (O'Toole 2010).
[39] For the seven largest transit systems in the San Francisco Bay Area, operating costs increased by 83 percent% between 1997 and 2008, whereas the consumer price index increased by 39 percent. Over this period, transit service, measured as revenue vehicle hours, increased only 15 percent and ridership increased only 7 percent (MTC Transit Sustainability Project 2010, available at www.mtc.ca.gov/planning/tsp/ABAG_Focus_presentation.pdf).

Rail systems—while often preferred to buses by users—are especially costly to build and operate, leaving them open to criticism of cost-ineffectiveness and waste (O'Toole 2010; Poole and Moore 2010).

If transit is to contribute to achieving SB 375's goal of reducing VMT, strategies will be needed to increase ridership and improve cost-effectiveness. Both transportation policy and land use decisions are likely to play important roles. Research on transit uptake finds that the likelihood of transit use increases with access; distance to transit is sometimes considered the fifth "D" (Ewing and Cervero 2010). As Kolko (2011) shows, commuter use of transit falls significantly when workers live more than one-quarter to one-half mile from a fixed-line transit node, and even faster when their workplace is located at a greater distance. Transit use is higher in areas with higher residential and, especially, employment densities (Kolko 2011). Transit use is also more likely when there is more street connectivity and a diversity of land uses, both of which can smooth transit operation and make using transit more appealing by reducing distances between origins and destinations and walking distances to transit stops (Ewing and Cervero 2010).

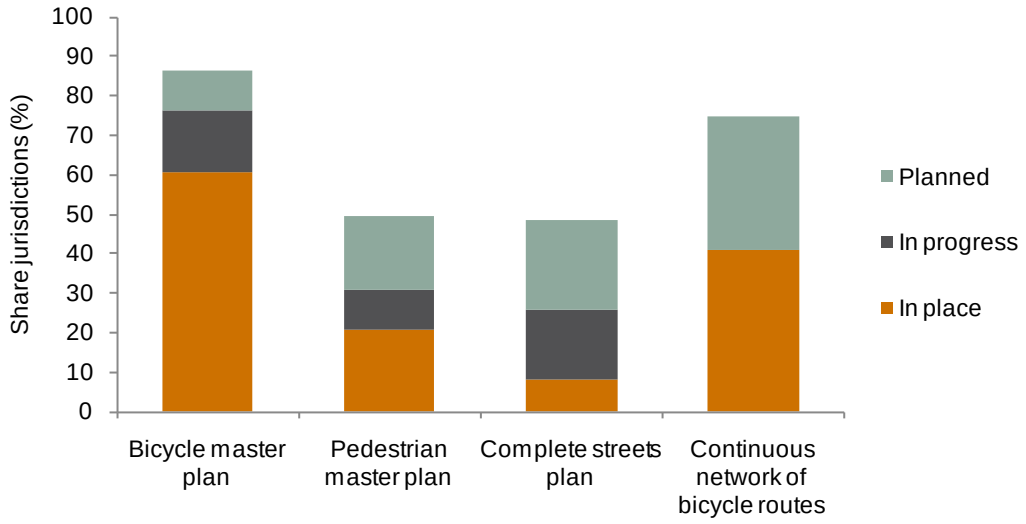
In three of the largest regions, planners ranked insufficient transit availability as one of the top three barriers to meeting goals for reducing driving.[40] Many survey respondents expressed concerns about the ability to maintain adequate transit service in the face of recent state cuts to transit budgets, which have led to service cuts and fare increases across the state. Perhaps as a result, they ranked funding for transit operations and capital investments as the two most serious public sector funding constraints for development decisions that could reduce car use (appendix Table B2). In this context, it is worth noting that very few local governments currently assess developer fees to support transit alternatives: Only 14 percent now do this, although another 11 percent are considering this policy (appendix Table B10). Developer fees have been an important source of support for local infrastructure in California since the 1970s (Hanak and Rueben 2006; Hanak 2009), and there appear to be opportunities to make greater use of such fees to support improvements to local transit networks.

Walking, Biking, and "Complete Streets"

In addition to transit, many localities are looking to pedestrian and bicycle infrastructure to provide an alternative to driving (Figure 10). Nearly 90 percent of California's cities and counties have completed or plan to complete a bicycle master plan, and 40 percent of all jurisdictions have already established a continuous network of bicycle routes. Roughly half of all localities have similar planning under way for a pedestrian master plan or a more comprehensive "complete streets" plan. Complete streets plans aim to improve safe access for all users, including pedestrians, bicyclists, and transit users, as well as those using cars (National Complete Streets Coalition 2010).

[40] See appendix Table B24 (j). For the Bay Area, insufficient transit availability ranked highest among nine barriers; this constraint ranked second highest (after public opposition to raising charges for driving) in the Southern California region, and third (after public opposition to density and the jobs-housing balance) in the San Diego region.

FIGURE 10
Cities and counties are actively planning bicycle and pedestrian infrastructure



SOURCES: Biking, walking, and complete streets plans, appendix Tables B11–B13; bicycle routes, appendix Table B12.

NOTE: Percentages for bicycle master plan, pedestrian master plan, and complete streets plan are responses to the question "Has your city/county developed any of the following …". Percentages for the continuous network of bicycle routes are responses to the question "Which of the following transportation options are available in your city/county …".

Federal and state policies have supported these efforts. In the early 1990s, the federal government began to focus policy attention and funding on walking and biking in an effort to reverse the decline in these modes as a share of all trips and to reduce pedestrian and biking fatalities, which had been increasing (Federal Highway Administration 2010a). Federal funding for these programs increased over the following two decades, reaching 1 percent of all federal transportation dollars, and these programs received an additional large boost with the federal stimulus bill passed in early 2009.[41] Some federal funding was also aimed at making routes to school safer for walking and biking. California's Bicycle Transportation Act, signed into law in 1994, provided additional funding through the state's transportation tax funds and focused on local assistance to improve access and safety for bicycle commuters.[42] To be eligible, local government applicants must complete a bicycle transportation plan. In 2008, the California Complete Streets Act (AB 1358) was adopted, seeking to improve mobility and safety throughout the full range of transportation modalities.[43]

Recent analysis at the national level suggests some success in increasing walking and biking as a share of all trips since 1990, and some decline in fatalities.[44] Both nationally and in California, walking declined as a share of commutes over this period, and biking increased slightly, both from a low base. (In California in 2008, walking and biking accounted for 3 percent and 1 percent of all commutes, respectively).[45] Walking

[41] Nationwide, $600 million were made available annually by the late 2000s, and this figure doubled in 2009 with the American Recovery and Reinvestment Act funds (Federal Highway Administration 2010a).
[42] More information on the Bicycle Transportation Account is available at www.dot.ca.gov/hq/LocalPrograms/bta/btawebPage.htm.
[43] The new law requires cities and counties to update the circulation of their general plans to indicate how streets will accommodate all users. For information on implementation of the policy, see www.dot.ca.gov/hq/tpp/offices/ocp/complete_streets.html.
[44] Between national surveys conducted in 1990 and 2009, walking increased from 7.2 to 10.9 percent of all trips, and biking from 0.7 to 1 percent. However, changes in survey methodology may have increased the recording of walking and biking trips, potentially overstating these gains (Federal Highway Administration 2010a). Comparable data are not available at the state level.
[45] In California, biking increased slightly, from 0.97 to 1.04 percent, between 1990 and 2008; and walking declined from 3.5 to 2.9 percent. The comparable national figures are, for biking, increasing from 0.4 to 0.6 percent, and for walking, declining from 4 to 2.9 percent. (U.S. Census and American Community Survey).

accounts for a greater share of (typically shorter) non-commute trips; however, reducing car use for shorter trips can have disproportionately high benefits for GHG emission reductions, because gas mileage tends to be lower on such trips.[46] And as noted earlier, improving pedestrian access to transit is important for increasing transit usage. Finally, facilitating the use of these alternative modes of transportation is often inspired by the goal to improve public health.[47]

Increasing the Cost of Driving

Over the past two decades, transportation planners have also focused increasing attention on the potential for financial incentives to manage congestion and reduce emissions. These incentives include explicit pricing tools—such as fuel and road-use charges and parking fees—as well as a group of incentives that practitioners often refer to as "demand management" tools—such as carpool lanes, employee shuttles, and other employer incentives to use transit. Both groups of tools work by creating financial or time-saving incentives to shift trip timing away from peak periods and by making alternatives such as transit, carpooling, and telecommuting relatively more attractive (Deakin et al. 1996; Parry 2009). To the extent that these tools improve gas mileage—a benefit of reduced congestion—they also reduce GHG emissions for a given level of VMT.

In addition, many of these tools generate revenues to support the transportation system. Sustainable funding of the transportation system is, in and of itself, a major policy concern, with numerous studies indicating a large and growing gap between revenues and funding needs for transportation investment and maintenance (National Surface Transportation Infrastructure Financing Commission 2009). Transportation analysts consider pricing tools a preferred way to fund transportation, because they simultaneously raise revenues and send a signal to users to use the system more efficiently. The alternative—funding transportation through general tax revenues—does not help to manage demand. Local sales tax revenues, which have become an important funding source in recent years, are also highly regressive. However, public opposition can be a formidable challenge to implementing fee increases, as discussed below.

Federal, State, and Regional Pricing Policies

State and federal gas taxes are the primary pricing tool in place today.[48] Per gallon gas taxes were introduced in the early 20th century to raise revenue for transportation infrastructure. These taxes are a simple form of user fees, resulting in higher charges for those who drive more. Nationally, sensitivity to gas prices appears to have declined over the past several decades, a phenomenon that analysts have attributed to the greater reliance on cars brought on by more sprawling land use patterns (Hughes, Knittel, and Sperling 2008).[49]

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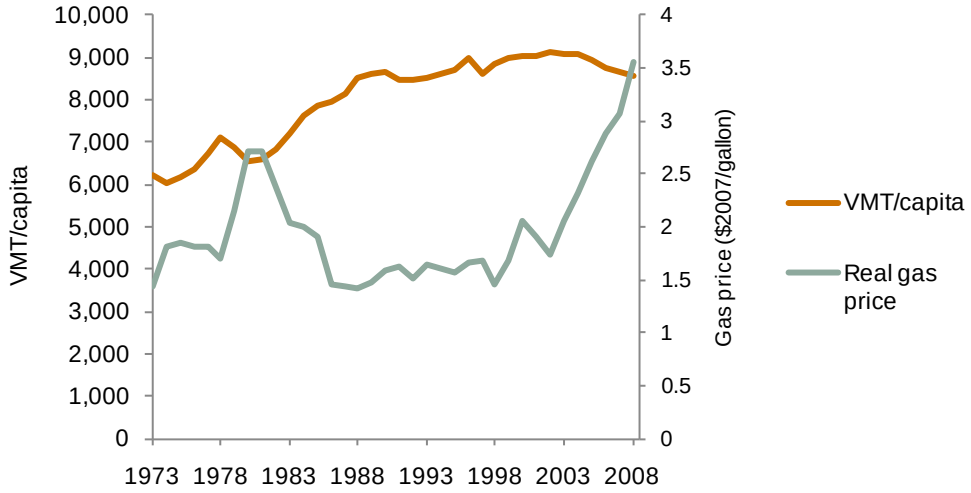
[46] In a 2001 national survey of travel behavior, walking accounted for 2.8 percent of commute trips, 7.1 percent of trips for family or personal business, and 14.5 percent of trips for social or recreational purposes (Hu and Reuscher 2004, appendix Table 9). Bicycle trips were not reported.
[47] Research has shown that increased walking and physical activity is linked to improved health outcomes, including lower rates of obesity and body mass index, both of which are lower in residents of more compact communities (Ewing et al. 2003; Doyle et al. 2006).
[48] California counties can also impose their own gas tax, but they have not pursued this option. The San Joaquin Valley Air Pollution Control District has implemented another sort of pricing program that is also being looked to by other regions—the indirect source review fee. This is a fee that is placed on new development to offset the air pollution impacts of increased travel associated with that development. A lower fee may be imposed if the new development is designed to reduce the amount of induced travel. More information on the indirect source review fee is available at www.valleyair.org/rules/currntrules/R3180.pdf.
[49] These authors estimate that the short-run price elasticity of gasoline demand ranges from -0.034 to -0.077 for the 2001–2006 period, a significant drop from the 1975–1980 period, where the range was between -0.21 and -0.34. The income elasticity of gasoline demand is not significantly different between the two periods.

Nevertheless, large increases in gas prices can generate sizable VMT reductions (Figure 11).[50] The large run-up in gas prices from 2004 to 2008, when average real prices jumped by 54 percent, was accompanied by a 5.8 percent decline in per capita VMT.[51] Although the declines toward the end of this period were likely influenced by the onset of the recession, the decline in VMT per capita began in 2005, when the economy was still booming.

FIGURE 11
VMT per capita in California declined when gas prices began rising in the mid 2000s



SOURCE: VMT data from Federal Highway Administration, Annual Highway Statistics, Table VM-2, 2010b. Inflation-adjusted gas price data are from the California Energy Commission, 2009.

One advantage of the gas tax is its administrative simplicity. Over time, however, rising fuel economy and the lack of political will to increase the gas tax have reduced its usefulness as a source of revenue and a price signal to drivers (Wachs 2010). The federal gas tax has remained at $0.184 per gallon since 1993, and California's has remained at $0.18 since 1994,[52] somewhat below the national average and far lower than fuel taxes in Europe or Japan.[53] Although raising these taxes and indexing them to inflation could help restore transportation revenues while sending a stronger price signal to drivers, transportation experts see far greater potential over the longer term in an alternative form of user fee—per-mile or VMT charges.

VMT-based fees, which rely on new electronic toll collecting and geographic positioning system technologies, have the potential to be more flexible than the gas tax: they can be varied according to time of day,

[50] To spur real change, some have argued that gas price increases not only need to be large enough, but also sustained. This has led to proposals for a gas price "floor" that could create more certainty for developers of alternative fuels and other alternatives to traditional single-occupant driving (Sperling and Gordon 2008; Borenstein 2008).
[51] In mid 2008, close to 70 percent of Californians reported that they had cut back on the amount they drove as a result of higher gas prices, and over half had used alternative means of travel (Baldassare et al. 2008).
[52] In early 2010, California's gas tax was increased, with a corresponding decrease in the sales tax on gasoline. This revenue-neutral "fuel tax swap"—adopted to provide more budget flexibility—will be invalidated under Proposition 26 (described below) unless the legislature approves it again with a two-thirds majority by November 2011 (Legislative Analyst's Office 2011).
[53] The national average is $0.224/gallon. State gasoline taxes range from $0.075 in Georgia to $0.375 per gallon in Washington (Energy Information Administration 2010). Like many other states, California also levies a sales tax on gasoline, similar to that charged on other goods. A portion of the state sales tax revenues is dedicated to transportation funding since the passage of Proposition 42 in 2002 (de Alth and Rueben 2005). Gas taxes within the European Union range from about $1.90 (Bulgaria) to $3.70/gallon (the Netherlands) and are generally augmented by general value-added taxes (European Commission 2010). Japan's gas tax is roughly $2.25/gallon (Ministry of Finance Japan 2006).

type of road, and type of vehicle. Developments in road and vehicle sensors have made VMT-based fees more administratively feasible. Road metering has been gaining ground outside of the United States (Sorenson and Taylor 2005a, 2005b; Spears, Boarnet, and Handy 2010).[54] Within the United States, a successful pilot program for passenger vehicles was recently completed in Oregon (Rufolo and Kimpel 2009).[55] Based on these experiences, a recent national panel recommended that the federal government actively promote pilot programs with VMT charges as part of the next federal transportation funding authorization, with a goal to fully convert to VMT charges by 2020 (National Surface Transportation Infrastructure Financing Commission 2009).

To date, road pricing initiatives in California have been more targeted. Bridge tolls have long been a feature of transportation policy in the San Francisco Bay Area. Statewide, most expansions of highway lane miles since the early 1990s have been for carpool or "high-occupancy-vehicle" (HOV) lanes (Hanak and Barbour 2005). Following the principle that "time is money," these lanes provide an incentive to reduce solo driving. Since the mid-1990s, some Southern California metro areas have also experimented with the introduction of road tolls.[56] Most of these projects, called high-occupancy-toll (HOT) or "express" lanes, combine free access for carpoolers with a toll option for solo drivers. In several cases, including the I-15 in San Diego and Route 91 in Orange County, and the newly opened HOT lanes on parts of I-680 in the Bay Area, the tolls are variable with the time of day, intending to help manage congestion during peak periods. Like more general VMT-based pricing, HOT lanes rely on electronic toll collection technology, and the revenues are often used to fund infrastructure improvements, including transit, within the same transportation corridors.

Expansion of HOT lanes is a major component of planned roadway spending within several major metro areas. Within the Bay Area, MTC plans to convert HOV to HOT lanes on most of the region's highways and to build new HOT lanes.[57] In addition, the region has recently introduced variable tolls on the San Francisco–Oakland Bay Bridge to reduce traffic congestion during peak periods. Following the successful experiences of London and Singapore (Santos 2005), the San Francisco County Transportation Authority is also considering a cordon pricing scheme (or entry toll) for the downtown core (Bent and Singa 2009).[58] Additional HOT lane conversions and expansions are also slated for several southern California highways.[59] The Sacramento area, in contrast, is still focusing on expansion of HOV lanes. Given all of the planned conversions and expansions, roughly 40 percent of the localities in our survey (with over 60 percent of the surveyed population) will be

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[54]For instance, several European countries now have automated, weight-distance truck tolls on national highways (Sorenson and Taylor 2005a). The Netherlands plans to introduce a program for commercial trucks nationwide, with expansion to all vehicles by 2018 (Stein 2008). Stockholm introduced a congestion-based fee following a trial in which traffic volumes and travel times decreased, with most of the change attributable to a shift to public transit (Eliasson, et al. 2009). Public transit services were expanded to and within the fee zone.

[55] The Oregon pilot program included a flat VMT fee and a congestion-based fee that was higher during peak traffic hours. In both cases, the fee was set to be roughly equivalent to gas tax revenues. Both types of fees resulted in a reduction in total daily VMT, although the reduction was larger in the groups that experienced variable VMT fees (Rufolo and Kimpel 2008). Access to transit had a small additional effect on VMT reduction for study participants (Rufolo and Kimpel 2009).

[56] Hanak and Rueben (2006) provide descriptions of the early projects in Southern California.

[57] When fully built out, MTC estimates that the HOT lane network will cover almost 800 miles. The plan is to convert 400 miles of existing HOV lanes to HOT lanes and construct 100 miles of new HOT lanes in the next four years. Part of the revenue generated will fund the construction of approximately 300 miles of new HOT lanes (Metropolitan Transportation Commission 2009).

[58] For more on the San Francisco congestion pricing program, see www.sfcta.org/content/view/302/148/.

[59] Conversion without expansion of lane capacity is likely to be more effective at reducing VMT, but it is also more politically difficult, particularly if it results in the reduction of open-access lanes. One challenge with conversion of HOV to HOT lanes is the desirability of having more than one HOT lane, so that traffic can flow smoothly in the event of an accident. Since most HOV lanes are single lanes, this means either build-ing an additional lane or converting an existing open-access lane to HOT status. In the Bay Area, planners are working to create single-lane HOT lanes from existing HOV lanes in ways that avoid these problems. The new HOT lane on I-680 has double lanes at entry and exit points, but a single lane elsewhere.

within five miles or less of at least one HOT lane, with slightly higher availability of HOV lanes. As with HOV lanes, the efficacy of HOT lanes depends on existing traffic conditions and delays (Dahlgren 2002).

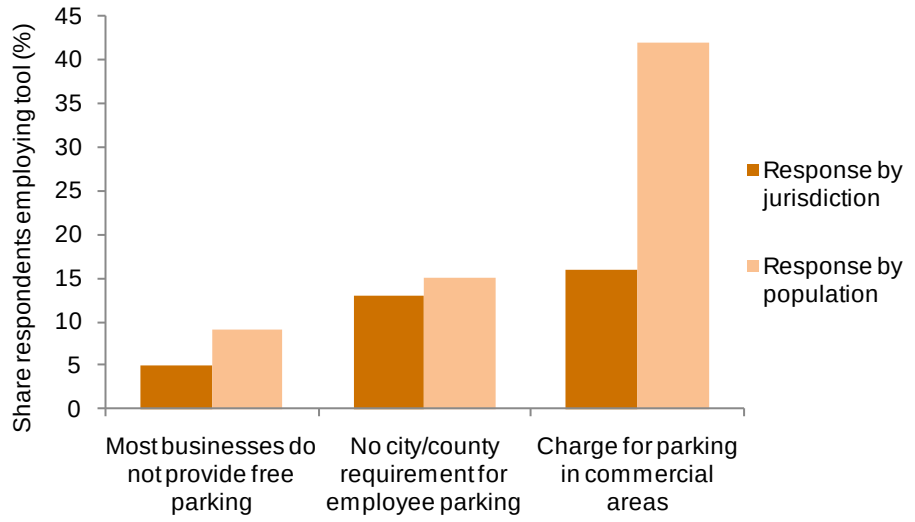
Local Parking Policies

In contrast to road charges, which are generally determined at the regional level, parking charges and related policies are established by local governments. An analysis of cities worldwide estimates that, on average, 30 percent of vehicles in congested traffic are looking for a place to park (Shoup 2004).[60] Charging for public parking spaces can reduce this congestion, encourage the use of alternative means of transportation, and generate revenues at the same time (Giuliano and Agarwal 2010; Shoup 2005). Local policies regarding parking requirements for new development are another type of indirect pricing tool. Limiting the requirements for developers to provide parking not only increases density but can also make the use of automobiles relatively more expensive (Shoup 1999). Studies have also shown that solo driving and car use are often substantially reduced when employees must pay for parking.[61]

Parking charges are still a little-used pricing tool in California. Statewide, only 16 percent of the cities and counties in our survey have any type of charges for public parking in commercial areas—although this includes the most populous localities (Figure 12). Revenue generation is the primary reason these localities charge for parking, although many also do so to promote retail shopping or to manage congestion (appendix Table B18). At least two San Francisco Bay Area cities are adopting innovative approaches, setting prices to maintain a minimum vacancy level (to reduce the time drivers spend searching for parking) and employing advanced technology to make parking more convenient.[62]

[60] Estimates range from a low of 8 percent (New York in 1993) to a high of 74 percent (Freiburg, Germany, in 1977).
[61] California Legislative Analyst's Office (2002). One study cited found that 77 percent of San Francisco Bay Area commuters provided with free parking drove alone, versus only 39 percent of those required to pay for parking. The corresponding figures for transit use were 4.8 percent and 4.2 percent, respectively. In their review of factors influencing transit ridership, Taylor and Fink (2003) also stress the central role of parking availability.
[62] Redwood City adopted a parking management plan in 2005 that set prices to steer different types of parkers to different areas (e.g., downtown workers to free spaces further out, shoppers to prime spots near retail, etc.) and to maintain 15 percent vacancy at all times to cut down on cruising. The city also eliminated time limits to create a more convenient experience for parkers. And it installed high-tech parking meters to facilitate implementation and increase convenience, reinvesting all revenue generated through the parking program into the downtown core (Zack 2005). In 2010, San Francisco began implementing ParkSF, a variable-priced parking program designed to manage parking demand in a few areas of the city (http://sfpark.org/).

FIGURE 12
Parking management is a little-used local tool



SOURCE: Appendix Tables B17–B19.

NOTE: Results shown for the following questions: Do businesses in your city/county provide free parking for employees? Does your city/county require new commercial and office developments to provide employee parking? Does your city/county charge fees for public parking in commercial neighborhoods?

Other parking tools relate to zoning codes. A large and growing share of jurisdictions is relaxing minimum parking requirements for some new residential and commercial developments. However, free parking for employees remains the norm, and the vast majority of localities continue to require new commercial and office developments to provide employee parking (Figure 12). Apart from the strong positive association between population and the use of parking charges, there are no discernable local characteristics associated with the use of parking fees or policies regarding employee parking (appendix Table C4).

The Challenge of Public Acceptance

Pricing tools can be among the most effective in inducing changes in driving behaviors. However, the introduction of new fees can raise public opposition. Although our survey of local officials indicated that public opposition was an obstacle for all three types of policy tools, this problem may be especially important for pricing. Among a range of measures, perceived public opposition to higher charges for driving ranks a close second to public opposition to higher density as a barrier to implementing policies and programs to reduce driving (appendix Table B24(j)). And, as evidenced by the inability of both Congress and the California legislature to raise the gas tax since the early 1990s, the need to gain legislative or voter approval for many fees increases the difficulties of raising fees. Proposition 26, a new state constitutional amendment passed in November 2010, is likely to compound these difficulties for some types of fees.[63]

[63] This amendment, passed by 53 percent of voters, raises the vote threshold for new state regulatory fees from one-half to two-thirds, and it requires a two-thirds supermajority of the voting public to approve or raise local regulatory fees that formerly could be approved by a simple majority of governing boards. Although this change does not affect strict user fees—i.e., charges that cover the costs of providing a service to the person being charged—it does affect fees that are used to benefit others. Litigation will likely be required to sort out the exact definition of what falls under the new rules. Thus, while parking fees, toll lane charges, the gas tax, and VMT charges could easily be considered user fees helping to cover the cost of providing transportation services, some may interpret the new rules to restrict the types of programs that the fees can fund.

Past experience may help overcome opposition to some pricing options—for example, those involving choice. Early concerns that toll lanes were inequitable have been allayed somewhat by use patterns: A broad cross-section of the population uses the toll facilities on the I-15 and Route 91 (Sullivan 1998; University of California Transportation Center 2003). At the margin, the time savings associated with the HOT lanes is valuable for many drivers, not just the wealthiest. According to the Southern California transportation officials we interviewed, the use of toll revenues to support parallel infrastructure and services is another important factor in garnering public support.

In contrast, broader VMT charges risk opposition if they are viewed as an addition to existing gas tax charges. Board members of SANDAG, the San Diego area MPO, recently rejected the introduction of a regional VMT-fee because, in contrast to HOT lanes, it would be applied uniformly, not giving users alternative roadway options (San Diego Association of Governments 2010). Large increases in federal or state road charges through a gas tax or VMT fee would surely raise public ire. In the short-run, raising gas taxes or introducing VMT fees might also raise equity concerns, because lower- and middle-income households would have less flexibility to respond by moving closer to transit or purchasing more fuel-efficient vehicles.

Parking policies face the challenge of balancing the needs of commercial areas to attract customers and create business, while also managing congestion. And they can raise objections in mixed-use areas, where efforts to reduce commercial spaces can result in spillover to nearby residential streets.[64] One strategy that has helped overcome opposition is the reinvestment of parking revenues in the downtown area in which they are collected, a model used in Redwood City (Zack 2005) and Pasadena (Salzman 2010). Resistance to higher parking charges may also be offset once residents find that it is easier to find a parking space (since one of the goals of such fees is to keep vacancy rates to a low but acceptable level, such as 15 percent).

Maximizing Potential through Integrated Approaches

Although numerous empirical studies have examined pieces of the VMT-reduction puzzle, it is much more challenging to develop a comprehensive picture of how various policies will interact to affect driving behaviors in particular regions (Rose 2010). For this purpose, models are needed which integrate data and assumptions about land use, transportation network services, and pricing, and the way the population will respond to these factors, as well as changing economic and social conditions. California's MPOs and state agencies are at various stages in their development of such models. Although the largest MPOs generally have the greatest capacity, even they face significant challenges in linking land use policies and transportation network conditions (RTAC 2009; Rose 2010). Thus, to some extent, planning for VMT reductions will be a learning-by-doing process.

Nevertheless, existing research suggests some useful guideposts. A review of modeling studies in the United States and Europe highlights several key points (Table 5):[65]

[64] For example, in Bakersfield, efforts to limit parking availability have met with resistance from retailers who felt that they needed additional parking to accommodate peak shopping days such as "Black Friday." And the cities of Los Angeles and Cypress encountered problems of spillover in mixed use areas.

[65] For detailed reviews of the literature on various strategies, see the Transit Cooperative Research Program's *Traveler Response to Transportation System Changes Handbook*, available at http://jayevansconsulting.com/index.php?com=resources&id=1015 (accessed on November 29, 2010).

1. When used on their own, land use tools are likely to generate only modest reductions in VMT. The median reduction in VMT from land use changes ranges from 0.5 percent within 10 years to 1.7 percent within 40 years.
2. Expansion of public transit, on its own, does not fare better. The median VMT reduction ranges from 0.3 percent within 10 years to 1 percent within 40 years.
3. Of the three types of policy tools, pricing is likely to have the largest and quickest impact on VMT. The median VMT reductions for comprehensive tools, such as a fuel tax and a VMT fee, are in the range of 8 to 10 percent within 10 years, and 11 to 13 percent within 40 years. Less comprehensive tools, including congestion and cordon pricing and parking charges, also have higher near-term median reductions than land use or transit, in the range of 2 to 3 percent within the first 10 years.
4. Integrated policies, combining all three types of policy tools, have the largest and fastest potential effect: a median reduction of 14.5 percent within 10 years, and 24 percent within 40 years.

TABLE 5
Combined strategies show the largest potential for reducing VMT

	Reduction in VMT (%)		
	10 years	**40 years**	**n**
Land use only	0.5	1.7	19
Transit only	0.3	1.0	20
Pricing only			
Fuel tax	8.4	12.9	17
VMT fee	9.9	11.1	27
Congestion pricing	2.3	3.8	9
Cordon pricing	2.8	1.7	16
Parking charges	2.2	2.0	16
Combined strategies	14.5	24	15

SOURCE: Rodier (2009).

NOTE: The table reports median reductions. For a display of ranges, see Figure 5 in Bedsworth, Hanak, and Kolko (2011).Combined strategies include all three categories of tools (land use, transit, and pricing). Holding vehicle and fuel characteristics constant, VMT reductions and GHG emission reductions are equivalent.

This last point—that integrated policies are most likely to be effective—makes abundant sense. Transit ridership is likely to be higher when land use is tailored to favor density around transit nodes, thus facilitating access for residents and, perhaps especially, workers. Higher density land use, in turn, will be more effective in reducing car trips when transit and other alternatives to cars are more readily available. Increased ridership can then lead to increased revenue and service. Several cities have described this "cycle of benefits," including San Francisco, Poway, San Luis Obispo, Sacramento, and San Carlos. The city of Merced is integrating this goal into its land use planning, proposing a "village concept" development pattern—with commercial centers surrounded by dense housing—as a central feature of its general plan. This concept is a central component of the city's strategy to improve the convenience of transit and boost ridership.

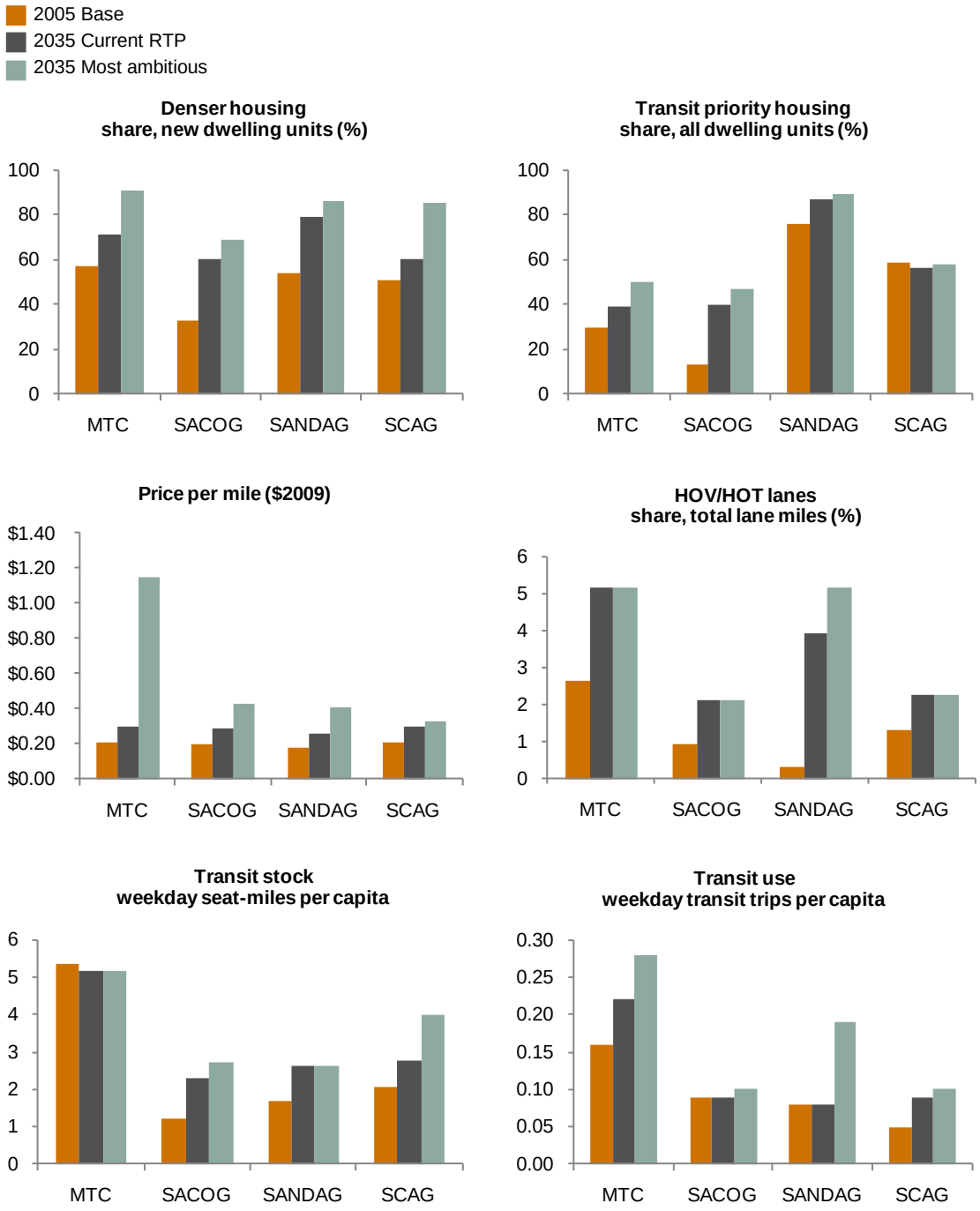
Both land use and transit strategies will be favored by pricing incentives that make solo driving relatively more expensive. And perhaps most important from a social and political perspective, the increased cost of driving will be less onerous for the population when alternatives to driving are readily available.

Research results, such as those shown in Table 5, suggest that California's regions can meet the new regional targets under SB 375 by pursuing integrated strategies. It is encouraging to note that to some extent, California's largest MPOs are already pursuing combined strategies to improve the efficiency and effectiveness of the transportation system while reducing negative environmental impacts. This trend is reflected in many of the regional Blueprint strategies and the most recent RTPs, and further efforts are anticipated under SB 375.

Figure 13 illustrates the types of multipronged approaches already underway and under consideration. It compares 2005 baseline conditions for several key indicators (shown in orange) with two scenarios of potential change by 2035: the most recent RTP (gray) and the "most ambitious" scenario prepared as part of the SB 375 target-setting process (blue). Baseline conditions differ across regions in some important respects: The Bay Area already has substantially more transit capacity and transit ridership than other regions, and the Sacramento region has a much lower share of "denser" housing units (attached small-lot, single-family homes). The Bay Area and the Southern California SCAG region have more HOV/HOT lane miles per resident than the two smaller regions.

In the current RTPs, all four regions plan to ramp up efforts in all three policy areas, although pricing receives short shrift. The cost per mile increases in the current RTPs are anticipated primarily from increased fuel costs, and only SANDAG includes a small congestion fee. In its most ambitious scenario, the Bay Area anticipates an aggressive pricing strategy: expansion of HOT lanes, ramping up congestion fees on roads and bridges, and higher parking fees. This region also anticipates denser land use and increased transit ridership with a constant level of per capita transit stock. In both scenarios, San Diego's strategy relies on substantially increased densities (in the current RTP, over three-quarters of all new housing will be attached), some expansion of transit-oriented development, and expansion of HOT lanes, but at much more modest prices than the Bay Area. Sacramento anticipates a major push toward denser housing and transit expansion, from a lower base than the other regions. The Southern California region envisages a constant level of per capita transit trips, despite increases in transit capacity and a focus on housing in transit-priority areas. HOV and HOT lane expansions play some role.

FIGURE 13
The state's largest MPOs are pursuing multipronged strategies



SOURCE: Heminger et al. (2010).

NOTE: Denser housing consists of attached units and small-lot, single-family units (lots below 5,500 square feet). All transit-priority housing is located in transit-priority areas, defined as being within one-half mile of frequent (15 minute or less) peak transit. Price per mile cost consists of vehicle fuel and maintenance costs as well as congestion, VMT, parking, and other fees, if applicable. HOV and HOT lane share is calculated as a percentage of total mixed flow lanes and HOV/HOT lanes. Transit seat miles (seats available per mile) includes all forms of transit. For projected regional population growth rates, see Table 1.

Local Perspectives on the Potential to Reduce Driving

We have discussed how some of the large regional planning agencies perceive their potential to reduce GHG emissions associated with driving, as well as the types of regional and local tools they anticipate using to achieve this goal. What about city and county planners?

To explore this issue, we asked survey respondents to provide an assessment from two perspectives: the potential effectiveness of various policy tools within their localities (an *absolute* measure of potential), and how their locality's potential to reduce driving compares with other jurisdictions within their region (a *relative* measure). In contrast to the regional agencies, most local governments do not have detailed quantitative estimates of this potential, so the questions were posed as a simple ranking exercise. The results can be interpreted as planners' views of the feasibility of these tools and approaches within their communities, taking into account both political acceptability and various other community characteristics that make it easier or harder to make these approaches work.[66]

Ranking Policy Tools

We asked planners to assess the potential of 16 individual policy tools, including five smart-growth land use strategies (mixed-use, high-density, or infill development; transit-oriented development; reduced parking requirements; urban growth boundaries; and other land use incentives) five transit options (local buses, express buses, express bus to rail, rail transit, and continuous network of bicycle routes), and six pricing tools (parking fees, gas prices, pay-as-you-drive insurance, variable road pricing based on congestion, toll lanes, and carpool lanes). Ranking options included high, low, or no potential to reduce or shorten car trips in their locality over the next few decades.

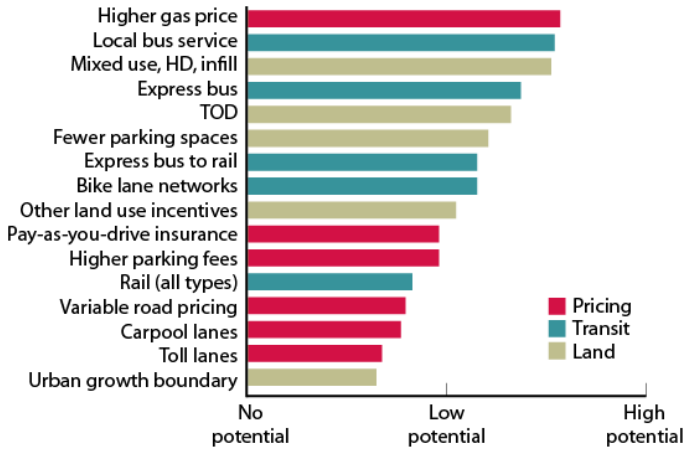
Like regional transportation agencies, local governments see potential in a range of approaches to reducing VMT. The top five tools—higher gas prices; local bus service; priority sites for mixed use, high-density, and infill land uses; express bus service; and priority sites for transit-oriented development—fall into the three different policy categories. No particular category of policy tools stands out as having the most potential to reduce VMT over the next few decades: 36 percent named land use policies, 35 percent named investments in transit and other alternatives to driving, and 30 percent named policies that affect the cost of driving (appendix Table B20).

Many respondents expressed the need for integrated approaches, in particular linking smart-growth land uses with improved transit options and more accessible streetscapes. Several city officials also indicated the need for better connectivity between transit systems and outlying areas and job centers. For example, San Luis Obispo sees potential for interregional transit to provide a convenient alternative to commuters traveling into the city (where more jobs are located) from outlying communities. Current service that only operates twice a day is not sufficient. Poway, a city in San Diego County, has similar experience. According to a local planner, express bus service into San Diego operates at about half capacity. The planner estimates

[66] We did not explicitly refer to SB 375, to avoid concerns that the responses might be used to gauge compliance with the law. Also, the survey was completed before CARB released draft regional emission targets in June 2010, so respondents did not know the level of the regional targets.

that "better service and connectivity on the San Diego end" would increase ridership and provide a more attractive alternative to driving.

FIGURE 14
Planners view a mix of tools as having high potential to reduce VMT



SOURCE: Appendix Tables B9, B13, and B19.

NOTE: The policy potential score was calculated as the sample average of the potential ranking for each policy option. A score of 3 was given for high potential, 2 for low potential, and 1 for no potential. For commuter rail and light rail, the score is combined into a single rail category."HD" is high density development and "TOD" is transit-oriented development.

One anomaly in this balanced vision, however, is the split view of pricing tools. Although higher gas prices ranks first among all 16 policies examined, all other pricing tools rank near the bottom. Note, moreover, that the survey asked about gas prices, not gas taxes. We chose this wording to avoid conflating concerns over the perceived political feasibility of raising the gas tax with the perceived effectiveness of a resulting increase in gas prices. Planners' views of the effectiveness of gas price increases is consistent with the research literature on this tool, but their low expectations regarding other pricing tools is in conflict with the research (Table 5). The explanation may reflect both recent gas price history and political realities. On the one hand, the state's recent experience with high gas prices demonstrated the potential of increased costs to reduce VMT (Figure 11). But this experience was also politically convenient, as it happened through market forces, not an explicit policy change. Most other pricing options would be implemented at the local and regional level, and planners are aware of the political difficulties of imposing higher costs on drivers. The opposition faced by SANDAG regarding a regional VMT charge, discussed above, illustrates the problem. Modeling showed that this would be the most effective way to reduce GHG emissions, but the local government-led board did not want to approve comprehensive fee increases. MTC's tentative proposal to move aggressively on regional road tolling and congestion pricing in its most ambitious scenario (Figure 13) could well face similar local opposition.

One surprising result is the relatively high ranking for continuous networks of bicycle infrastructure. Half of all planners give this a "high potential" score, and only 8 percent consider it to have no potential to reduce driving in their localities. In the Bay Area and the Sacramento region, this tool ranks higher than any other transportation alternative. To some extent, this optimism may reflect the unique governance aspect of this alternative—in contrast to other transit options, this one is nearly always under local control. In addition,

recent boosts in federal and state funding have focused local attention on this tool. At the same time, the limited role of bicycles in current trip shares (currently only 1 percent of commutes in California), and the fact that they are not likely vehicles for large segments of the population, raises questions about their overall potential. Interviews revealed that planners' optimism for this tool takes into account this low baseline. Also, in many cases, local strategies are focusing first on improvement of bicycle routes as a recreational amenity, with the expectation that this could spur changes in non-recreational trips.

Factors Associated with Higher Potential

Planners' optimism about the potential for various tools to reduce driving is influenced by several local characteristics:[67]

Experience Matters

First, tools are nearly always ranked significantly higher in localities that already are using them or planning to use them. The likelihood of ranking a smart-growth land use tool as having a high potential, rather than no potential, increases by 26 to 40 percentage points in localities that have already adopted the tool, and 21 to 29 percentage points in localities that are considering adoption. For some transit alternatives, this effect is even stronger: Having or anticipating the introduction of rail transit raises the likelihood of ranking this option highly by roughly 50 percentage points. Similarly, planners in localities that charge for parking have a significantly more optimistic view of its potential, and the same is true regarding existing or planned HOV lanes. The major exceptions to this pattern are toll lanes and congestion pricing, where there is no significant boost from being located near these managed lanes.[68] Of course, localities are most likely to adopt policies that they expect will work in their circumstances. But optimism is as high or higher for policies that are already in use, rather than those that are under consideration, suggesting that local planners are not greatly discouraged by on-the-ground barriers to implementation.

Rail Transit Is a Plus

In localities that already have some form of rail transit (light rail, commuter rail, subway, or streetcar), planners have significantly greater optimism not only about rail itself, but also about most other tools.[69] With the exception of urban growth boundaries—a generally low-ranked tool—rail access increases the likelihood of ranking smart-growth land use tools in the high-potential category by 12 to 20 percentage points. It also raises the likelihood of perceiving all other transit options more favorably, as well as several pricing tools (higher parking fees, higher gas prices, and congestion pricing).[70] This strong showing for localities with rail is consistent with the research finding that integrated strategies can have a greater impact on VMT. Rail transit can complement other transit options, enhance the use of smart-growth land use tools, and make pricing tools more acceptable. As one official noted: "we have substantial vacant land …[and] existing light

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[67] This discussion draws on the multiple regression results in Appendix Tables C-5 through C-7.
[68] In addition, already having a policy of reduced parking requirements for qualifying developments does not have a significant effect on ranking (although planned policy of this nature does), and planned local bus service does not have a significant effect (although existing local bus service does). The difficulties encountered in implementing reduced parking requirements, noted above, may account for the more pessimistic view on this tool. For local bus service, the insignificant result is likely because only a handful of low-population localities fall into the "planned" category.
[69] In contrast, there is no systematic effect on the ranking of other tools in localities with planned access to rail or with express bus to rail services.
[70] For these tools, rail raises the likelihood of moving from a "no" to "high" potential ranking by 13 to 29 percentage points.

rail. This combination gives us the opportunity to 'get it right.'" Nevertheless, the slow progress in the use of public transit in metro areas that have expanded rail in California suggests much progress is still needed to capitalize on this potential.

In contrast with these findings for rail, use of land use and pricing tools does not systematically increase planners' optimism regarding the potential of other tools. More intensive use of smart-growth tools (as measured by the number of tools adopted) is not associated with higher optimism on any tools except reduced parking requirements for qualifying developments. Planners in localities that have parking charges (the only explicit local pricing tool) appear more optimistic regarding the potential of toll lanes, but less optimistic regarding another pricing tool that has recently come under discussion—the use of "pay-as-you-drive" insurance. Familiarity with parking fees does not augment perceived potential of land use or transit options. These findings highlight the unique role played by rail in shaping expectations about integrated strategies.

Local Conditions Shape Expectations

Several other local factors shape planners' expectations, but in less systematic ways. Planners in more populous locales are more optimistic about the full range of pricing tools, as well as the potential for transit-oriented development. Consistent with the research literature, which finds that lower income residents are more sensitive to gas price changes, planners in lower income localities anticipate that higher gas prices will be more effective at reducing driving. They also anticipate greater effectiveness of most rail and bus options, which are more commonly used by lower income residents (Barbour 2006). Consistent with the idea that proximity of jobs to residents makes it easier to employ integrated strategies, officials in localities with a higher jobs-housing ratio are more optimistic regarding the potential of most pricing tools, access to rail, and the promotion of transit-oriented development.[71] The extent to which this potential will be realized, in practice, also depends on whether there is a good match between local job skill needs and local workforce skills (Cervero and Duncan 2006).

In contrast, various other geographic and economic characteristics—population growth rates, distance from central business district, and density—play at most a limited role. Faster growing localities—which should have more flexibility regarding land use tools—do not register any significant differences in ranking from those growing more slowly. Nor are there strong signs that "edge" communities, located further from central business districts, have less potential, even though the greater distances workers must often travel should make transit options less attractive.[72] Theory provides different predictions with regard to the potential effects of residential density. On the one hand, higher density should raise the potential of transit, given the strong association between density and transit use. On the other hand, localities that are already relatively dense can face greater challenges with infill development and other types of smart-growth land use tools, which can involve costly upgrades to local infrastructure, including underground water and sewer lines. We find no evidence that density affects the potential for land use or pricing tools, and only partial evidence for the boost to transit: Localities with higher residential densities rank express bus service significantly higher.

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[71] The jobs-housing ratio is calculated as the number of jobs relative to the number of households within a jurisdiction in 2006. A jobs-housing imbalance ranked as one of the top two perceived barriers to implement policies to reduce driving in several regions: San Diego, the San Joaquin Valley, the "Other MPO" group (including Central Coast counties and several northern Sacramento Valley counties), and the "non-MPO" group, including rural counties not currently required to comply with SB 375 (appendix Table B24 (j)).

[72] Distance from CBD has a marginally negative relationship with gas prices, controlling for other factors (appendix Table C7).

Party Leanings Are Influential, But Not Determinative

Residents' party affiliation also shapes their expectations. Most pricing tools are ranked lower in localities with a higher share of registered Republican voters, consistent with the stronger objection to taxes and fees commonly associated with this party's platforms.[73] Planners in these areas do not downgrade the potential of higher gas prices to lower VMT (confirming the distinction among pricing tools noted above), but they recognize that the politics of imposing higher fees and taxes would make these tools more difficult to implement in these locations. Planners are also more skeptical about the potential for transit-oriented development in more heavily Republican areas, and are less likely to use this tool.[74,75] Because many of the state's fastest growing counties are located in the more heavily Republican inland regions, this partisan split may limit the effectiveness of SB 375 in places where there is the greatest potential to "build smart" from the ground up.

However, party affiliation is not determinative. Adoption of most smart-growth land use tools is not affected by residents' party affiliation, nor is the perceived potential of many individual tools that can support SB 375 goals. And experience in the Republican-leaning San Diego region demonstrates that party affiliation is not a deal-breaker for developing aggressive regional strategies. Using a combination of increased housing densities, increased transit, and more HOV and HOT lanes, the SANDAG region's existing RTP is already one of the most ambitious in the state (Table 2). SANDAG's board, composed of its local government officials, approved a "most ambitious scenario" for presentation to CARB in which 83 percent of all new dwelling units are attached housing and nearly 90 percent of all units are in transit-priority areas (Heminger et al. 2010.).

Comparing Localities

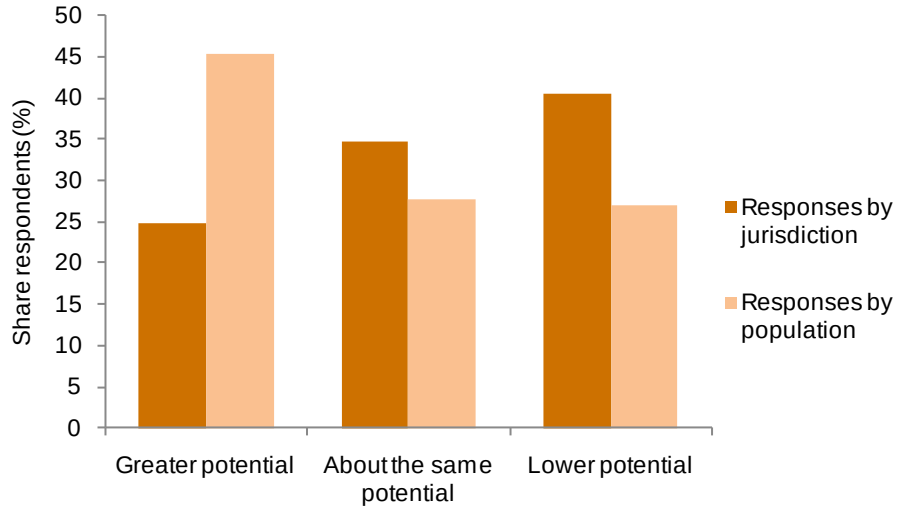
How do planners rate their locality's potential for reducing GHG emissions, relative to other localities in their region? Across all jurisdictions, the answer is "slightly below average": Only 25 percent of respondents believed that their region had a higher than average potential to reduce GHG emissions, compared to 41 percent who believed that their locality had less than average potential (Figure 15). However, the balance tilts to the other side of the scale when accounting for size: 45 percent of the sample population lives in localities that officials believe have higher than average potential, versus 27 percent in localities with lower than average potential.

Beyond size, most other significant factors are similar to those associated with individual policy tools.[76] Notably, planners in lower income localities anticipate greater potential, as do those with access to rail transit. Numerous respondents cited access to transit as giving them an edge, both for attracting jobs and as hubs for transit-oriented development. Public attitudes also appear very important: Potential is lower in

[73] In addition to the tools listed under the pricing heading (appendix Table C7), planners in these localities also ranked reduced parking requirements for qualifying developments, which we have grouped under land use tools (appendix Table C5), as having significantly less potential. This can also be considered an implicit pricing tool.
[74] See appendix Table C2. TOD is the only land-use tool for which party affiliation is significant.
[75] Another measure of public attitudes—intensity of public opposition to various tools—is less systematically associated with greater skepticism. Strong public opposition to density does not reduce the perceived potential of smart-growth land use tools, and strong opposition to higher charges for driving does not reduce the ranking for pricing tools. However, strong opposition to transit use lowers the likelihood of ranking express-to-rail and express bus services as a high-potential tool by 14 to 15 percentage points. This measure, derived from the survey, includes localities where respondents consider public opposition to be a very serious barrier.
[76] This paragraph discusses results from regression analysis reported in appendix Table C8. Among geographic and economic factors, only population density matters: Controlling for population, localities with lower density perceive higher potential to reduce driving.

localities with a higher share of Republican voters, as well as in those where planners believe that public opposition to tools that could reduce driving is a serious impediment.

FIGURE 15
Planners in localities with larger populations perceive a higher potential to reduce GHG emissions with transportation and land use policies



SOURCE: Appendix Table B21.

These findings on overall potential to reduce driving present some interesting juxtapositions with the general climate action tools discussed above. In both cases, size matters: more populous jurisdictions are more active in climate policy, and their planners are more optimistic about their potential to be effective at meeting the specific goals of SB 375. These jurisdictions are also better served by the types of tools that can help: more smart-growth land use tools, more rail and express bus service, more HOV and HOT lanes, and more fee-based parking.

In both cases, income also matters, although in opposite ways. Better-off localities are more active in climate policy, as they tend to be in environmental policy more generally. But planners correctly perceive that achieving the goals of SB 375 will be more difficult in these localities, because residents can more easily afford to keep driving even when the costs are increased and when transit alternatives are more readily available.

Planners are also acutely aware of the dampening effect that public opposition can play. In particular, the partisan split on climate policy in California, which has widened over the past two years, is reflected in adoption patterns for general climate policy actions and the perceived potential to respond to SB 375.[77] However, as noted, party affiliation does not appear to be an obstacle across the board: Adoption of most smart-growth land use tools is not affected, nor is the perceived potential of many individual tools that can support SB 375 goals.

[77] Statewide surveys find that Republican voters are less supportive of AB 32 goals than Democrats or Independents, and this gap has widened since 2008 (Baldassare et al. 2008, 2010).

Conclusions

California's pioneering new climate law, SB 375, is one of the first in the nation to set a goal of reducing the GHG emissions associated with passenger vehicle use. Although the law is expected to play only a modest role in meeting the state's overall emission reduction targets (less than 3 percent of the 2020 goal), it has the potential to significantly shape the interplay between land use and transportation policy in the years to come.

Three main types of tools—land use that encourages higher densities and closer proximity to transit, expanded transit and other alternatives to driving, and pricing policies that affect the cost of driving—are being considered to achieve the regional emission targets for 2020 and 2035. Although none of these tools are new, the law has focused attention on their potential effectiveness and room for expansion. The state's major Metropolitan Planning Organizations—responsible for meeting the new targets—are considering ramped up actions in all three areas.

The success of these efforts will ultimately depend on how California residents and businesses respond to new policies, incentives, and public investments. But a key intermediate set of players are city and county governments. Their officials determine regional transportation policy directions by virtue of their membership on MPO boards, and their policy and practical decisions on local land use, streetscapes, and parking policy crucially affect the effectiveness of transportation policies and spending.

Our survey of these local governments finds some grounds for optimism regarding the implementation of this new state policy to curb GHG emissions. Despite the recent economic downturn and associated fiscal stress, cities and counties have stepped up their general climate policy actions, with many more localities now undertaking GHG emission inventories and developing Climate Action Plans than in 2008. We also find significant local government adoption of tools that can support SB 375 goals, including smart-growth land use tools and improved pedestrian and bicycle infrastructure. More populous localities—which have a higher carbon footprint—are the most active when it comes to general climate policy and the most likely to adopt these specific actions.

Transit capacity expansion, largely undertaken by local and regional transit agencies, has constituted a major share of transportation capital spending (20 to 30 percent) for several decades, and this trend is likely to continue. Bus service is available in the vast majority of localities, and the major expansion effort has been in more costly rail transit, which serves the state's most populous communities in the major metropolitan regions.

One concern with land use tools is their limited potential for reducing driving when they are not used in conjunction with other tools. The concern is similar for transit: There have been only modest gains in the share of transit-based commute trips between 1990 and 2008, from a small base (5 to 5.5 percent of all commutes), and transit is used even less for non-commute trips. By these criteria, transit is an underperforming asset.

Pricing tools—which have the largest and fastest potential to encourage changes in travel behavior—are relatively underutilized. Per gallon federal and state gas taxes are low and haven't risen since the early 1990s, and California's local governments have done little to date with parking policies. Nearly 90 percent of all local governments require new commercial and office developments to provide employee parking; and most businesses provide this parking for free, discouraging transit use.

The main pricing innovation is occurring at the regional level. Following several successful projects in Southern California, regional transportation agencies in Southern California and the Bay Area have recently stepped up plans to expand the use of high occupancy toll lanes, and to vary pricing on these lanes by time of day. Indeed, the San Francisco Bay Area's MPO is placing significant emphasis on increasing the cost of driving as a way to reduce VMT. But broader efforts to raise the gas tax or to replace it with a mileage-based fee—as called for by many transportation experts—have been stymied by political opposition. The consequences are not only the lack of incentives for drivers, but also the lack of revenue to support the transportation network.

Combined strategies, which integrate land use, transit, and pricing, have the highest potential to change driving behaviors—something both regional agencies and local governments recognize. However, local planners present anomalous views on the potential for pricing tools: They rank gas prices highest among a large set of tools but give very low scores to other pricing tools—including parking charges, toll roads, and carpool lanes, all determined by regional and local policies. These perceptions reflect the difficult politics of road pricing and other pricing tools.

Planners appear to have a good sense of some of the local factors that are likely to affect potential to respond effectively to SB 375. They are most optimistic about tools already in use or planned within their localities, highlighting the positive role of experience. They are also much more optimistic about the potential for most other tools when they have rail, the most popular (if most costly) form of transit. This view reflects the potential of rail to help coalesce integrated strategies. Nevertheless, the slow progress in the use of public transit in metro areas that have expanded rail in California suggests much progress is still needed to capitalize on this potential. As Kolko's findings (2011) suggest, more focused efforts are needed to locate jobs as well as housing near transit nodes. Even though most local governments consider job creation a high priority, the lack of faster employment growth surrounding most of the state's new transit stations since the early 1990s suggests that jobs do not "take care of themselves."

Other challenges to meeting SB 375 goals relate to community characteristics. Even though higher income communities are more likely to adopt climate action plans, their planners consider them less likely to respond to SB 375-related incentives to reduce driving. Higher income households are less sensitive to pricing tools, and they are less likely to use transit. Party affiliation—notably a higher share of Republican voters—is also a barrier to adoption of general climate policies, and it lowers overall perceived potential to meet the goals of SB 375. However, party affiliation does not appear to block the use of various individual policy tools, such as higher density land use.

In sum, our analysis confirms that local governments—key partners in the implementation of SB 375—are already taking actions to help spur the types of changes in land use and transportation that can reduce Californians' need to drive. And local planners are also optimistic about the potential for many of these tools to contribute to this goal. Opportunities lie ahead, as do challenges. Coordination among local governments, within a regional framework, will be essential to make the most of the tools available.

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About the Authors

Louise Bedsworth is a research fellow at the Public Policy Institute of California. Her research focuses on air quality, transportation, and climate change issues. Before coming to PPIC in 2006, Louise was a senior vehicles analyst at the Union of Concerned Scientists. She holds an M.S. in environmental engineering and a Ph.D. in energy and resources from the University of California, Berkeley.

Ellen Hanak is a senior fellow at the Public Policy Institute of California. Her career has focused on the economics of natural resource management and agricultural development. At PPIC, she has published numerous reports and articles on water policy, land use planning, infrastructure policy, and climate change. Before joining PPIC in 2001, she held positions at the French agricultural development center (CIRAD), the President's Council of Economic Advisers, and the World Bank. She holds a Ph.D. in economics from the University of Maryland.

Elizabeth Stryjewski is a research associate at the Public Policy Institute of California. Before joining PPIC, she supported research efforts at the National Oceanic and Atmospheric Administration (NOAA) and at the Equinox Center in San Diego. She holds an M.A. from the University of California at San Diego's School of International Relations and Pacific Studies, where she focused on international environmental policy, and a B.A. in East Asian Studies from Stanford University.

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PUBLIC POLICY INSTITUTE OF CALIFORNIA
500 Washington Street, Suite 600
San Francisco, California 94111
phone: 415.291.4400
fax: 415.291.4401
www.ppic.org

PPIC SACRAMENTO CENTER
Senator Office Building
1121 L Street, Suite 801
Sacramento, California 95814
phone: 916.440.1120
fax: 916.440.1121