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State-Level Strategies for Reducing Vehicle Miles of Travel

A Research Report from the University of California Institute of Transportation Studies

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16. Abstract California adopted a statewide target of reducing greenhouse gas emissions to 40% below 1990 levels by 2030. To meet these goals, the state must achieve a 15 percent reduction in total travel by light-duty vehicles by 2050 compared to expected levels. Under current state policies, reductions of this magnitude are likely. This report explores the evidence for strategies to reduce vehicle miles of travel in pricing, infill development, transportation investments and travel demand management programs. For each category, the report outlines programs from other states that, if adopted, have the potential to reduce VMT and thus greenhouse gas emissions.			
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State-Level Strategies for Reducing Vehicle Miles of Travel

UNIVERSITY OF CALIFORNIA INSTITUTE OF TRANSPORTATION STUDIES

September 2017

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Executive Summary

The California Global Warming Solutions Act of 2006 (Assembly Bill 32) created a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in the state to 80% below 1990 levels by 2050. With the recent passage of Senate Bill 32, the State of California has adopted an additional target of reducing greenhouse gas emissions to 40% below 1990 levels by 2030. To meet these goals, the state must achieve a 15 percent reduction in total travel by light-duty vehicles by 2050 compared to expected levels.^{1,2} Under current state policies, reductions of this magnitude are unlikely.

Strong evidence exists that strategies across four categories – pricing, infill development, transportation investments, and travel demand management programs – can reduce vehicle miles of travel (VMT).³ The state can directly implement some of these strategies, particularly pricing strategies, through state-level policies. Others depend on actions by regional and local governments, though state-level policies can encourage their implementation through incentives, requirements, or other mechanisms.

In this paper, we identify policies and programs that are implemented or being considered at the state level for each category of strategies. States have a more direct role in implementing pricing strategies and shaping transportation investments than they do in promoting infill development and transportation demand management programs, but examples of state-level policies are found across all four categories of strategies. As California is formulating policies and programs for VMT reduction, the information presented in this paper may help guide the prioritization and refinement of state policies. Summaries of each category are as follows:

Pricing

Many states are considering pricing strategies as a way to increase funding for transportation and in some cases to manage congestion, but few as a way to decrease VMT or GHG emissions. Several states, including New Jersey and Pennsylvania, have substantially increased their fuel taxes, either through one-time increases or by indexing them to inflation or other measures. Others, such as Texas, have expanded the use of tolling. Georgia, Texas, and California have implemented congestion pricing for optional toll lanes. California and New York impose higher tolls on bridges during peak hours and both have considered the cordon-pricing form of congestion pricing, in which drivers pay a toll to travel into a designated area during peak times, in selected locations. A growing number of states is considering mileage-based fees as a replacement for fuel taxes. Following Oregon's lead, California is launching a pilot study of mileage-based fees and several other states are considering such studies. States have not proposed policies that impose higher prices on vehicles with higher per-mile GHG emissions.

¹ https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf, page 104

² <https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>, page 37

³ <https://arb.ca.gov/cc/sb375/policies/policies.htm>

Infill development

Development decisions are traditionally the responsibility of local governments, both cities and counties, but state policy can influence these decisions. Several states, including California, Arizona, Connecticut, Delaware, and Maryland, have adopted requirements for local governments to consider GHG emissions in their plans. California requires Metropolitan Planning Organizations (MPOs) in the state to develop Sustainable Communities Strategies that include land use policies that will help to reduce GHG emissions. MPOs do not have land use authority, however, and thus rely on grant programs to encourage cities and counties to implement these policies. At the state-level, California has created a number of grant programs to encourage infill development and has adopted changes to state policy that aim to ease the way for infill development; researchers are beginning to examine the impact of these policies. State-level growth management policies, such as those adopted by Oregon and some northeastern states, also help to encourage infill development, at least indirectly.

Transportation investments in bicycling and walking

Many states, including California, have adopted bicycle and pedestrian plans, and several have established grant programs for local governments for funding for facilities. While states have often initiated safe-routes-to-school programs, their support for other educational and promotional programs has been more limited. Several states have invested in recreational trails that may also serve as transportation routes. No states have adopted policies to subsidize or incentivize bicycle purchases, though such programs are common in Europe. Overall, states have played a key role in supporting local efforts to shift drivers to walking and biking.

Transportation investments in transit

Transit systems in the U.S. primarily depend on a combination of federal funds and regional and local taxes, but state funding is also important. In California, the state allocates approximately \$2.5 billion to transit each year through several different programs that target specific needs.⁴ States also support transit through the development of statewide transit plans and the implementation of programs that help to fill needs not met by transit agencies.

Transportation demand management

Many employers across the U.S. have voluntarily implemented programs to encourage their employees to choose options other than driving alone to work, but state-level requirements for employer-based trip reduction programs are rare. Washington and Oregon require employers of a certain size and/or in certain locations to adopt such programs. Several states have established telecommuting programs for state employees, but states have not adopted requirements for private employers to establish such programs.

⁴ California Transportation Financing Summary, Fiscal Year 2015 – 2016
http://www.dot.ca.gov/docs/CA_Transportation_Financing_Package_2015-16.pdf.

Introduction

The California Global Warming Solutions Act of 2006 (Assembly Bill 32) created a comprehensive, multi-year program to reduce greenhouse gas (GHG) emissions in the state to 80% below 1990 levels by 2050. With the recent passage of Senate Bill 32, the State of California has adopted an additional target of reducing greenhouse gas emissions to 40% below 1990 levels by 2030. To meet these goals, the state must achieve a 15 percent reduction in total travel by light-duty vehicles by 2050 compared to expected levels.^{5,6} Under current state policies, reductions of this magnitude are unlikely.

Strong evidence exists that strategies across four categories – pricing, infill development, transportation investments, and travel demand management programs – can reduce vehicle miles of travel (VMT).⁷ The state can directly implement some of these strategies, particularly pricing strategies, through state-level policies. Others depend on actions by regional and local governments, though state-level policies can encourage their implementation through incentives, requirements, or other mechanisms. Research shows that local level climate action happens when it is enabled by strong local champions, supportive residents, and state and national policies and actions (Salon, et. al, 2014).

In this paper, we identify policies and programs that are implemented or being considered at the state level for each category of strategies. Our goal is to provide information that lays the groundwork for a state-wide VMT projection framework.⁸ In addition, as California is formulating policies and programs for VMT reduction, the information presented in this paper may help guide the prioritization and refinement of state policies. States have a more direct role in implementing pricing strategies and shaping transportation investments than they do in promoting infill development and transportation demand management programs, but examples of state-level policies are found across all four categories of strategies.

Pricing

State governments have implemented a variety of pricing strategies that result in VMT reductions, most notably fuel taxes, mileage based fees, and tolls. Many recently launched pricing strategies were motivated by the goal of increasing funding for transportation in the face of decreasing federal highway funds and fuel-related revenues. When sponsors pitch pricing strategies to either to the public or to legislators, some emphasize revenue generation through fees while others emphasize congestion reduction through pricing. Although the impulse and language differs, the effect of increased costs on consumers remains the same: decreased vehicle-miles traveled per person.

⁵ https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf, page 104

⁶ <https://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>, page 37

⁷ <https://arb.ca.gov/cc/sb375/policies/policies.htm>

⁸ https://ncst.ucdavis.edu/wp-content/uploads/2017/03/State-Level-VMT-Strategies-White-Paper_LP_EB1.pdf

Public support for taxes that go towards improved road maintenance has increased as road conditions have deteriorated. A national random-digit-dial public opinion poll completed to assess support levels for the tax options found that under certain conditions most Americans would support higher taxes for transportation (Agrawal and Nixon, 2017): 78% of respondents supported a gas tax increase of 10¢ per gallon if the revenues funded road maintenance and if funds were intended to improve safety, the support was also very high at 65%.

This report we examined several types of pricing strategies including fuel tax, mileage-based fees, tolls, congestion and area tolls, and various relational approaches to pricing policies. Table 1 provides an overview of state-level pricing strategies that have been adopted or proposed, categorized by type.

Fuel Taxes

Fuel tax policy can “control externalities associated with automobile use” and raise government revenue (Li et. al, 2012). All states and the federal government impose a tax on gasoline to fund facility maintenance and expansions. Research shows that increased fuel costs curb fuel usage (Boarnet, et. al, 2014) and thus reduce greenhouse gases. Many states, as well as the federal government, have not raised their fuel tax according to inflation and now find that they do not have enough funding to cover transportation infrastructure needs. Several states have recently approved regulations that link the tax to an inflation index, including Massachusetts, North Carolina, and Vermont, see table 1. Rhode Island fuel tax is specifically indexed to the Consumer Price Index for all Urban Consumers (CPI-U).

North Carolina developed a tax formula that considers not only inflation, but state population. North Carolina Senate Bill 20, 2015 states the following:

For calendar years beginning on or after January 1, 2018, the motor fuel excise tax rate is the amount for the preceding calendar year, multiplied by a percentage. The percentage is one hundred percent (100%) plus or minus the sum of the following:

- (1) The percentage change in population for the applicable calendar year, as estimated under G.S.143C-2-2, multiplied by seventy-five percent (75%).*
- (2) The annual percentage change in the Consumer Price Index for All Urban Consumers, multiplied by twenty-five percent (25%). For purposes of this subdivision, "Consumer Price Index for All Urban Consumers" means the United States city average for energy index contained in the detailed report released in the October prior to the applicable calendar year by the Bureau of Labor Statistics of the United States Department of Labor.⁹*

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<http://www.ncleg.net/Sessions/2015/Bills/Senate/PDF/S20v7.pdf?sessionId=1500312975876&referrer=https://www.google.com/&lastReferrer=www.taxrates.com>

Other states continue to raise taxes in price increments. Georgia increased its taxes from 7.5 cents to 26 cents for gasoline and 29 cents for diesel. Tennessee proposed that the revenues generated from the tax increase would be applied specifically to a regional transit system. Kentucky tied its gasoline tax to wholesale fuel prices to prevent the tax from falling below 26 cents.

Some states allow local authorities to levy additional taxes on fuel; Goldman and Wachs reported in 2003 that at least 9 states had enacted such laws in which some required voter approval and other did not (2003). Oregon, Nevada, and Florida allow local fuel taxes (see Table 1). As an example, Oregon enacted a law (ORS 319.950) that allows a city, county, or other local government to tax fuel for motor vehicles after submitting the proposed tax to the electors of the local government for their approval. Oregon law additionally limits the taxes exclusively for the “construction, reconstruction, improvement, repair, maintenance, operation and use of public highways, roads, streets and roadside rest areas in this state.” (Oregon Constitution, Article IX, Section 3a). In 2016, Portland voters approved a temporary “10-cent-a-gallon tax on gasoline within city limits, creating the highest local gas tax in the state.”¹⁰

States are revising the definition of fuel for taxing purposes to raise transportation funding and to equalize the fees for all road users, regardless of fuel type. The result is that those using alternative fuels now pay their share of tax for road usage. Connecticut, Florida, and Tennessee are some states that have expanded the definition of fuel going beyond gasoline and diesel to include biodiesel, gasohol, propane, natural gas and in Connecticut (CGS 12-458), “liquids that generate the power needed to propel a motor vehicle.”

Mileage Fees

Public opinion ultimately decides if pricing strategy policies are viable. Current research suggests that there is not majority support for mileage-based user fees pricing (Agrawal, Nixon and Hooper, 2016). A 2016 study found that “opponents of mileage user-fee exceed supporters by a ratio of 4–1” (Duncan, et. al, 2017). Concerns over privacy and implementation costs especially affect the political feasibility of VMT pricing strategies (Duncan and Graham, 2013). Pilot studies performed in Oregon and Iowa suggest that mileage-based fee pricing success is tied to communication, engagement, and messaging about the strategy, both with respect to the lawmakers and to the public (Whitty and Svadlenak, 2009). For example, authors Perez, Batac and Vovsha rank the expected difficulty in political/public acceptance in terms of facility types and they found pricing changes to existing toll areas “more acceptable,” but charging cordon tolls on existing non-toll facilities “proves difficult” (Perez, Batac and Vovsha, 2012).

States as well as the Federal Highway Administration recognize the growing divide between transportation needs and the ability to meet them with their current fuel tax structure. States regard a usage-based taxes, also called mileage-based user fees (MBUF) or road usage fees, or other terms that are based on vehicle-miles traveled, as a potential alternative financing mechanism. Demonstrating notable interest, federal, state, regional, and multi-state agencies

¹⁰ http://www.oregonlive.com/politics/index.ssf/2016/05/portland_gas_tax_road_repairs.html

have provided funding to further explore the concept.¹¹ As shown in Table 1, mileage-based user fee pricing has been tried at the scale of pilot studies in some metropolitan regions, at the state level, and across state boundaries as in the case of a coalition of northeastern states. In 2012 the U.S. Government Accountability Office called for federal mileage fee study.¹² Few pilot studies have been completed to date, but many states are considering studies or are in the process of researching VMT taxation.

Several states are researching various aspects of mileage taxation, laying the groundwork for potential fee changes. Completed in 2010, a University of Iowa study was the first to evaluate road user charges on a national and multijurisdictional scale. The 2-year field study evaluated the technical feasibility and user acceptance of mileage-based charging in 12 metropolitan areas throughout the country (Hanley and Kuhl, 2011).¹³ In 2010, the transportation agencies in the I-95 Corridor Coalition completed an initial study about the administrative, legal, and legislative aspects a mileage-based user fee system in a multi-state environment (I-95 Coalition, 2010). In a second phase, the Coalition conducted a case study with Maryland, Delaware, and Pennsylvania that included research on transitioning from the current fuel tax based revenue collection to one based on usage miles (I-95 Coalition, 2012).

Oregon completed mileage-based pilot programs in 2006 and 2012. In 2015, Oregon then launched a permanent program with a maximum of 5,000 participants that are being charged based on road usage and it is now prepared to launch statewide once it has legislative approval.¹⁴ Other states may follow. In February of 2017, Colorado began a new pilot study to determine the viability of a road usage charge to sustainably fund their transportation needs. With its unique ability to do vehicle research at the state level, Hawaii is poised to launch the largest study yet and has been awarded almost \$4 million to study the collection of user fees based on manual and automated odometer readings at inspection stations. Recognizing the need for long-term replacement of the outdated gas tax, Senate Bill 1077¹⁵ authorized California to study a road charge as a potential replacement. To this end, California launched a field trial with 5,000 participants in July 2016.¹⁶ Illinois, Indiana, Minnesota, Texas, and Washington have also conducted studies related to mileage based pricing (see Table 1).

Tolls and Congestion Pricing

Pricing strategies such as tolling become an attractive option when funding sources are restricted. When federal funding is limited or reduced, or when state taxpayers disapprove of increased spending on road infrastructure, states and transportation departments turn to toll options for both facility expansions and maintenance of existing systems.

¹¹ https://www.fhwa.dot.gov/ipd/revenue/road_pricing/defined/vmt.aspx

¹² <http://www.gao.gov/assets/660/650863.pdf>

¹³ <https://www.fhwa.dot.gov/pressroom/fhwa1648.cfm>; see also:

https://hidot.hawaii.gov/administration/files/2016/09/Hawaii-FAST-Act-RUC-Project-Narrative_v12-Final_.pdf

¹⁴ <http://www.myorego.org/about/>; see also: <http://usa.streetsblog.org/2017/06/26/oregons-pay-per-mile-driving-fees-ready-for-prime-time-but-waiting-for-approval/>

¹⁵ http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1077

¹⁶ <https://www.californiaroadchargepilot.com/about/>

Most states have tolling programs, including California (see Table 1); some have used innovative approaches to assess or calculate fees. For example, Connecticut has passed a toll that applies only to large cargo trucks and uses an electronic toll station to minimize schedule impact. Florida is indexing the fees to inflation through the consumer price index. Georgia, along with several other states not listed here, is using congestion pricing on optional toll lanes. Texas has a policy that says all new highways and all reconstructions should be evaluated for tolls. In studies funded by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), four metropolitan planning organizations (MPOs) incorporated road pricing in their long-range transportation plans and now serve as examples for other regions (U.S. Department of Transportation, 2011).

Economists agree that congestion-based tolling represents the single most viable and sustainable approach to reducing traffic congestion (U.S. Department of Transportation, 2011). It is also a means to secure transportation funding. Congestion pricing, sometimes called value pricing, is the concept of charging a variable fee based on the number, or volume, of vehicles using a bridge, road, tunnel, lane, or designated zone. The price is adjusted upward during times of congestion and downward, possibly even eliminated, when the facility is not congested. In effect, congestion pricing aims to change behavior through economic stimuli.

New technology allows tolls to be varied by a combination of factors such as time of day, congestion level, vehicle occupancy, day of week, season, payment method, and by other innovative scenarios. For example, technology has increased the capability for zone pricing, also called cordon or area pricing, wherein tolls can be varied based on residency or vehicle type to account for those that live in or deliver to a zone (see below). Technology can also enable the price to vary as often as every three minutes (Perez, Batac and Vovsha, 2012).

Cordon Pricing (Area Tolling)

Cordon pricing is also known as zone-based pricing, or area or area-wide tolling. Cordon pricing is a system where a fee is imposed on drivers as they enter a specific area, generally a city center and can vary based on time of day and/or traffic density. Financially speaking, cordon pricing is considered a regressive tax; however, some consider it equivalent to typical regressive fuel taxes and suggest that it could be offset by reducing another regressive tax (Mercatus Center, 2017). This system has been used in large cities outside of the United States beginning with Singapore in 1975, then London in 2003, and finally Stockholm in 2006 (Ops.fhwa.dot.gov, 2017). All of these cases show significant reductions in road congestion and simultaneously increases in transit ridership. Although both Stockholm and London increased transit services well ahead of the fee implementation, ridership did not change significantly until after the congestion fee was enacted.

Cordon pricing has been considered but not yet implemented in the U.S. New York City proposed cordon pricing with widespread public support, and the City Council approved it, but it was rejected in 2008 by the State Legislature. The proposal continues to be discussed as it

awaits political will, financial resources, and state resolve to be enacted (Fermino and Durkin, 2015; Anon, 2017). California has authorized Treasure Island, in the San Francisco Bay Area, to form a transit authority and to implement cordon pricing. San Francisco considered the feasibility of area-wide pricing through a program called Mobility, Access, and Pricing Study (MAPS). MAPS found that pricing could be a highly effective way to manage their transportation system and support the city's future growth plans.¹⁷ Los Angeles has implemented a pilot program called Express Travel Choices to study cordon pricing; as of fall 2016 it is engaging stakeholders, reviewing economic and environmental justice components of the cordon project.

Other Pricing Strategies

Another state-level strategy option is to allow local agencies to implement pricing strategies that go beyond state-level pricing. As noted above, California has authorized the Treasure Island to transit authority to implement cordon pricing and has authorized a locally-controlled tolling system through the Bay Area Express Lane Network. Texas has authorized locally-owned toll projects in perpetuity.

Parking pricing is another local strategy that states can encourage. Increases in the cost of parking have the potential to reduce VMT significantly (Spears, et. al, 2014). An alternative to increasing parking costs is a "parking cash-out" approach. At the federal level, tax law exempts employer-provided transit passes and other transportation-related benefits from federal income taxes up to an amount equivalent to the cost of parking offered other employees. California has a law with a similar purpose, enacted in 1992 and updated in 1998, referred to as the "cash-out law." In contrast to federal law, California's cash-out law requires the participation of employers that have at least 50 employees and provide leased or subsidized parking spaces for their workers (Weikel, 2015).

Reducing parking availability is another way to increase parking cost. The District of Columbia, like many local authorities, use flexible zoning to reduce parking requirements for developments, in their case by 30%.¹⁸ In 2004, London shifted from minimum requirements to maximum requirements for parking spaces for new developments, resulting in a 40% reduction in the number of parking spaces provided (Guo and Ren, 2013). Providing more parking in the right places can also help to reduce VMT. In 2009, Connecticut proposed a bill to build additional parking at transit locations that would encourage core area workers to commute via transit.

¹⁷http://www.sfcta.org/sites/default/files/content/Planning/CongestionPricingFeasibilityStudy/PDFs/MAPS_fact_sheet_080113.pdf

¹⁸https://library.municode.com/wa/arlington/codes/code_of_ordinances?nodeId=TIT20ZO_CH20.72PA_20.72.084_REPASPREPRALTR&showChanges=true

Table 1 Summary of State-Level Pricing Policies

Fuel Tax
<ul style="list-style-type: none"> ▪ California, 2017. 12 cent gas tax increase, 20 cent diesel excise, 4% diesel sales tax, and zero emission vehicle registration fees¹⁹ ▪ Connecticut, 2016. Fuel tax includes “Diesel, gasohol, propane, and combustible gases or liquids that generate the power needed to propel a motor vehicle”²⁰ ▪ Florida, 2014. Began taxing natural gas as a motor fuel²¹ Allows counties to levy fuel taxes.²² ▪ Georgia, 2015. Increased motor fuel tax significantly (from 7.5 to 26 and 29 cents for gas and diesel respectively)²³ ▪ Kentucky, 2015. Gasoline tax tied to wholesale fuel prices to prevent falling below 26 cents per gallon²⁴ ▪ Massachusetts, 2015. Gasoline tax increased and indexed to inflation²⁵ ▪ Nevada, 2013. Local authorities permitted to enact additional taxes on motor fuels with voter approval²⁶ ▪ North Carolina, 2015. Gas tax tied to a formula based on both the consumer price index and population. Starting Jan. 1, 2018, the rate will change at the beginning of each year based on a statutory formula that takes into consideration population and energy cost inflation.^{27, 28, 29} ▪ Oregon, 2013. Allows local governments to tax fuel.³⁰ ▪ Rhode Island, 2014. Gasoline tax indexed to Consumer Pricing Index for Urban consumers only³¹ ▪ Tennessee, 2017. Proposed fuel tax increase by 7 cents on gasoline and 12 cent on diesel to pay for regional transit system³² ▪ Vermont, 2013. Gasoline tax tied to inflation³³

¹⁹ http://mtc.ca.gov/sites/default/files/MTC_SB_1_Bill_Summary_4-7-17.pdf

²⁰ <https://www.cga.ct.gov/2016/rpt/pdf/2016-R-0191.pdf>

²¹ <https://www.flsenate.gov/Committees/BillSummaries/2013/html/439>

²² http://floridarevenue.com/taxes/taxesfees/Pages/local_option.aspx

²³ <https://tti.tamu.edu/policy/wp-content/uploads/2015/09/TTI-Testimony-091015.revenue-strategies-other-states.pdf>

²⁴ <https://tti.tamu.edu/policy/wp-content/uploads/2015/09/TTI-Testimony-091015.revenue-strategies-other-states.pdf>

²⁵ <https://tti.tamu.edu/policy/wp-content/uploads/2015/09/TTI-Testimony-091015.revenue-strategies-other-states.pdf>

²⁶ <http://www.reviewjournal.com/news/politics-and-government/clark-county/clark-county-fuel-tax-increase-passes-double-digit-margin>

²⁷ <http://knowledgecenter.csg.org/kc/content/state-gas-tax-increases-2015>

²⁸ <https://www.ncdot.gov/about/finance/>

²⁹ <http://www.ncleg.net/Sessions/2015/Bills/Senate/PDF/S20v7.pdf?sessionId=1500312975876&referrer=https://www.google.com/&lastReferrer=www.taxrates.com>

³⁰ <https://www.oregonlaws.org/ors/2013/319.950>

³¹ <http://flrules.elaws.us/fac/14-15.0081/>

³² <https://nextcity.org/daily/entry/dem-mayor-and-gop-gov-align-on-transpo-plan>

³³ <https://tti.tamu.edu/policy/wp-content/uploads/2015/09/TTI-Testimony-091015.revenue-strategies-other-states.pdf>

Mileage-based fees

- Federal, 2012. Proposal to assess federal mileage fees to fund surface transportation³⁴
- 12 states, 2005. University of Iowa studied the technical feasibility and user acceptance of mileage-based charging³⁵
- NE States and Hawaii, 2010. I-95 Corridor Coalition study on VMT, finds that a multi-state VMT fee is administratively viable.^{36, 37, 38}
- California, 2014. SB 1077 authorized road usage charge pilot program; findings expected in summer 2017. Road Charge Pilot Program engages the public to gain feedback on concerns of privacy, data security and technology³⁹
- Colorado, 2007. Authorized, findings expected in 2017. Road usage pilot program researching pay-by-mile system as a funding source, comparing rural/urban drivers, environmental conditions, and reporting technologies⁴⁰
- Connecticut. 2016. Proposal for a mileage fee pilot project⁴¹
- Hawaii, authorized 2016. Anticipating 1 million participants, statewide road usage charge demonstration with continuous feedback and modification.⁴²
- Illinois, 2013. VMT is tied to registration fee, intended for low mileage vehicles.⁴³
- Indiana, 2014. Study of transportation funding including based on vehicle weight, miles traveled, road charges, and damage caused^{44, 45}
- Massachusetts, 2016. Proposed VMT pilot program, politically opposed^{46, 47}
- Minnesota, 1995. Study to demonstrate technologies which will allow for the future replacement of the gas tax with a fuel-neutral mileage charge⁴⁸
- Oregon, 2013. Oregon passes Senate Bill 810 establishing the nation's first mileage-based (or road usage) revenue program for light vehicles.⁴⁹
- Oregon, 2015. OReGO – Volunteer, Road User-pays Pricing Solution, for 5,000⁵⁰
- Texas, 2010. VMT study identified challenges to acceptance, but, opportunities for financing,

³⁴ <http://www.gao.gov/assets/660/650863.pdf>

³⁵ <http://trrjournalonline.trb.org/doi/pdf/10.3141/2221-02>

³⁶ http://www.rand.org/content/dam/rand/pubs/tools/TL100/TL104/RAND_TL104.pdf, pp.13

³⁷ <http://i95coalition.org/projects/transportation-financing/>

³⁸ <http://news.transportation.org/Pages/NewsReleaseDetail.aspx?NewsReleaseID=1488>

³⁹ <https://www.californiaroadchargepilot.com/about/>; also see:

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB1077

⁴⁰ <https://www.codot.gov/news/2016-news-releases/11-2016/cdot-announces-road-usage-charge-pilot-research-program>

⁴¹ <http://www.ctpost.com/local/article/Lawmakers-run-down-mileage-tax-8328079.php>

⁴² https://hidot.hawaii.gov/administration/files/2016/09/Hawaii-FAST-Act-RUC-Project-Narrative_v12-Final_.pdf

⁴³ <http://www.cyberdriveillinois.com/departments/vehicles/cft/mileageintro.html>

⁴⁴ <http://news.indiana.edu/releases/iu/2016/10/mileage-user-fee-study.shtml>

⁴⁵ <https://iga.in.gov/legislative/2014/bills/house/1104>

⁴⁶ http://www.masslive.com/politics/index.ssf/2016/07/legislature_poised_to_ask_for.html

⁴⁷ http://www.masslive.com/politics/index.ssf/2016/08/citing_western_massachusetts_d.html

⁴⁸ https://ops.fhwa.dot.gov/publications/fhwahop11030/cm_primer_cs.pdf

⁴⁹ <https://olis.leg.state.or.us/liz/2013R1/Downloads/MeasureDocument/SB810>

⁵⁰ <http://www.myorego.org/about/>

recommended a trial on electric vehicles.⁵¹

- Washington, 2017. Road usage charge pilot project begins in fall 2017 with vision of per-mile system⁵²

Toll Charges

- Connecticut, 2011. Large cargo truck only toll using E-Z pass toll stations⁵³
- Florida, 2016. Indexed tolls to inflation (Consumer Pricing Index)⁵⁴
- Texas, 2003. Legislation converts non-toll state highway into a toll facility.⁵⁵
- Texas, 2014. Legislation allows locally owned toll projects in perpetuity⁵⁶
- Texas, 2015. Acceptance of congestion priced tolls and all new limited access highways should be evaluated for toll potential and all reconstructions should include priced express lanes as appropriate⁵⁷

Congestion-Priced Tolling

- USDOT, 2008. Urban Partnership Agreement Program for metropolitan areas (UPA) gained commitment to use congestion pricing in these locations:⁵⁸
 1. Los Angeles, CA⁵⁹
 2. San Francisco, CA
 3. Seattle, WA
 4. Minneapolis, MN
 5. Miami, FL
 6. Atlanta, GA⁶⁰
- California, 2010. State owned bridges in San Francisco bay area based on congestion.⁶¹
- Georgia, 2013. Congestion priced, optional toll lanes. “dynamically-priced toll lanes are intended to offer a more reliable trip”^{62, 63}
- Texas, 2009. Acceptance of congestion priced tolls and all new limited access highways should be evaluated for toll potential and all reconstructions should include priced express lanes as appropriate⁶⁴ Texpress will better manage mobility and congestion relief⁶⁵
- Washington, 2008. Congestion priced toll lanes and bridge, free for carpools⁶⁶

⁵¹ <https://texashistory.unt.edu/ark:/67531/metaph303676/m1/>

⁵² <https://waroadusagecharge.org/#what-is-ruc>

⁵³ <https://www.cga.ct.gov/2011/TOB/H/2011HB-05949-R00-HB.htm>

⁵⁴ <http://flrules.elaws.us/fac/14-15.0081/>

⁵⁵ <https://static.tti.tamu.edu/tti.tamu.edu/documents/PRC-14-3-F.pdf>

⁵⁶ <http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/PRC-14-3-F.pdf>

⁵⁷ https://ops.fhwa.dot.gov/publications/fhwahop11030/cm_primer_cs.pdf

⁵⁸ https://ntl.bts.gov/lib/55000/55600/55668/UPA_2015_Final_9-17-15.pdf

⁵⁹ https://www.metroexpresslanes.net/en/about/history_about.shtml

⁶⁰ <http://www.georgiatolls.com/about/history-statutes/>

⁶¹ <http://www.eastbaytimes.com/2010/06/28/bay-area-bridge-toll-questions-answered/>

⁶² <http://www.srta.ga.gov/georgia-express-lanes/>

⁶³ <http://www.peachpass.com/blog/tolling-a-part-of-georgias-transportation-past-and-future>

⁶⁴ https://ops.fhwa.dot.gov/publications/fhwahop11030/cm_primer_cs.pdf

⁶⁵ <http://www.texpresslanes.com/maps/texpress-lanes-map>

⁶⁶ <http://www.wsdot.wa.gov/Tolling/TollRates.htm>

Area Tolls – Cordon Pricing
<ul style="list-style-type: none"> ▪ California, 2017. Study of cordon pricing in Los Angeles area and proposing an ideal scenario of a LA countywide network of dual HOT lanes^{67, 68, 69} ▪ California, 2013. San Francisco produced a feasibility study of area pricing with a recommendation in favor.⁷⁰ ▪ California, 2008. Treasure Island Cordon pricing, authorized by state legislation AB 981 (2008) and AB 141 (2014)⁷¹ ▪ New York, 2007. Proposed to use cordon pricing, with widespread public and local government support, but blocked by legislature⁷²
Authorization of Local Pricing
<ul style="list-style-type: none"> ▪ California, 2008. Treasure Island Cordon pricing, authorized by state legislation AB 981 (2008) and AB 141 (2014)⁷³ ▪ California, 2009. Bay Area Express Lane Network authorized by AB 744⁷⁴ ▪ Colorado, 2013. Local governments given the power to spend their portion of the state’s highway user’s tax fund on an assortment of transit projects⁷⁵ ▪ Nevada, 2016. Counties given local authority to enact additional taxes on motor fuels with voter approval⁷⁶ ▪ Texas, 2011. Legislation allows locally owned toll projects in perpetuity⁷⁷
Parking Pricing
<ul style="list-style-type: none"> ▪ Federal. Combination of TEA-21, Taxpayer Relief Act, and Consolidated Appropriations Act established tax-free commuter benefits equal to parking benefits⁷⁸ ▪ California, 1992. Parking cash-out program to encourage alternate commute options (Assembly Bill 2109, Katz; Chapter 554, Statutes of 1992)⁷⁹ ▪ Connecticut, 2009. Proposal to encourage transit use by offering more parking at transit hubs⁸⁰ ▪ District of Columbia, 2015. Rule 11-2101 reduced parking requirements up to 30%.^{81, 82}

⁶⁷https://ops.fhwa.dot.gov/congestionpricing/value_pricing/projects/involving_tolls/zone_based_pricing/ca_cordon_area_la.htm

⁶⁸http://www.dot.ca.gov/d12/planning/pdf/MLFS_final.pdf

⁶⁹https://www.scag.ca.gov/Documents/SCAG_ComprehensiveBudgetFY1617.pdf

⁷⁰<http://www.sfcta.org/transportation-planning-and-studies/congestion-management/mobility-access-and-pricing-study-home>

⁷¹http://www.sfcta.org/sites/default/files/content/Planning/TreasureIsland/FinalReport/TIMMA_Pricing_report_072916.pdf

⁷²http://www.nyc.gov/html/dot/downloads/pdf/schaller_paper_2010trb.pdf

⁷³http://www.sfcta.org/sites/default/files/content/Planning/TreasureIsland/FinalReport/TIMMA_Pricing_report_072916.pdf

⁷⁴http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100AB744

⁷⁵<https://tti.tamu.edu/policy/wp-content/uploads/2015/09/TTI-Testimony-091015.revenue-strategies-other-states.pdf>

⁷⁶<http://www.reviewjournal.com/news/politics-and-government/clark-county/clark-county-fuel-tax-increase-passes-double-digit-margin>

⁷⁷<http://www.lrl.state.tx.us/scanned/srcBillAnalyses/82-0/SB19INT.PDF>

⁷⁸<https://www.nctr.usf.edu/programs/clearinghouse/commutebenefits/>

⁷⁹https://www.arb.ca.gov/planning/tsaq/cashout/cashout_guide_0809.pdf

⁸⁰https://www.cga.ct.gov/asp/cgbillstatus/cgbillstatus.asp?selBillType=Bill&bill_num=HB05033&which_year=2009

⁸¹https://www.municode.com/library/wa/arlington/codes/code_of_ordinances?nodeId=TIT20ZO_CH20.72PA_20.72.084_REPASPREPRALTR&showChanges=true

Infill Development

Infill development refers to building within unused and underutilized lands within existing building development patterns.⁸³ Although development decisions are the responsibility of local governments, states can influence local decisions by requiring cities to adopt general plans that lay out their visions for growth and development. California as well as Arizona, Connecticut, Delaware, and Maryland require general plans that detail how a region will grow and how it will reduce greenhouse gas emissions (see Table 2). This approach allows flexibility and accounts for local conditions when meeting reduction goals for the state. Research on local climate action by Salon, Murphy & Sciara (2014) found that state or national policies should give local communities as much latitude as possible to tailor local actions to local needs and opportunities.

California has been among the most aggressive states in adopting policies to encourage action at the local level to promote infill development. California's SB 375 (Steinberg, 2008) and SB 391 (Liu, 2009) were adopted to promote multi-modal investments and infill development (Gallivan and Grant, 2010). Under SB375, the state's Metropolitan Planning Organizations (MPOs) are required to develop Sustainable Community Strategies in conjunction with their Regional Transportation Plans.⁸⁴ SB 391 requires the regional Sustainable Community Strategies to be incorporated into the California Transportation Plan and to identify the statewide integrated multimodal transportation system needed to achieve maximum feasible emissions reductions (Gallivan and Grant, 2010). These policies have caused the state's four largest MPOs to prioritize infill development in areas served by transit along with investments in alternatives to driving (Sciara and Handy, 2017).

California has created other incentives for infill development. SB744, signed into law in 2015, reduces parking requirements for some affordable housing project, in addition to establishing density bonuses.⁸⁵ SB 743, signed into law in 2013, will facilitate infill development by moving the state away from a focus on level-of-service to a focus on VMT impacts in assessing transportation impacts under the California Environmental Quality Act (CEQA).⁸⁶ SB 226 enacted a streamlined CEQA review process for some infill projects.⁸⁷ California's priority development areas (PDAs) are locally designated areas within existing communities where increased housing or commercial growth will support the day-to-day needs of residents and workers in a pedestrian-friendly environment served by transit. In the San Francisco Bay Area, more than 70 city and county governments have voluntarily designated some 170 locations around the Bay Area as PDAs. California has also established a number of grant programs that

⁸² <http://www.dcregs.dc.gov/Gateway/ChapterHome.aspx?ChapterNumber=11-21>

⁸³ https://www.opr.ca.gov/s_infilldevelopment.php

⁸⁴ <https://www.arb.ca.gov/cc/sb375/sb375.htm>

⁸⁵ https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB744

⁸⁶ http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743;

https://www.opr.ca.gov/s_sb743.php;

⁸⁷ https://www.opr.ca.gov/s_sb226.php

incentivize infill projects.^{88, 89} Such grant programs, along with state and national funding, provide significant support for local climate action in general, although one-time programs, in contrast to ongoing funding, have more limited impacts (Salon, et. al, 2014).

Other states have employed a variety of strategies to encourage infill development (Table 2). As an incentive for developers to choose more central location for their projects, Florida proposed to enact “mobility fees” that make the connection between distance of a development from the core area and the cost of new roads. Connecticut offers zoning flexibility that promotes dense development near transit. Rezoning under the Smart Growth Zoning Overlay District Act in Connecticut, Chapter 40R, requires densities of at least eight units per acre, which is more than double typical metropolitan density, substantially increasing the supply of housing and consequently decreasing its cost.⁹⁰ New Mexico encourages the use of Transfer of Development Rights (TDR), a voluntary, incentive- based program that allows landowners to sell development rights from their land to a developer or other interested party who then can use these rights to increase the density of development at another designated location. Connecticut has new performance-based planning and programming requirements wherein actions must be consistent with six Growth Management Principles. Maryland, Delaware, Connecticut, New Jersey, Vermont, New York, Massachusetts, Pennsylvania, Maine) direct state funding to geographic areas designated for growth or infill development and constrain investments in areas designated for open space or rural preservation.

Table 2 Examples of State-Level Infill Policies from Beyond California

Planning Requirements
<ul style="list-style-type: none"> ▪ Arizona. Legislation requires cities, towns, and counties to adopt a general plan that addresses land use and circulation.⁹¹ ▪ Connecticut. Conservation and Development plan outlines six statewide (growth management principles incorporating priorities of compact growth, housing opportunity, transportation corridors, resource conservation, environmental protections, and integrated planning) that aim to coordinate future development. These six principles outline, among other considerations, the need to redevelop and revitalize areas with existing infrastructure and to concentrate development around transportation hubs and corridors.⁹² ▪ Delaware. Comprehensive plans have been required from localities since the inception of the Shaping Delaware’s Future Act in 1995.⁹³ ▪ Maryland. Smart, Green and Growing program requires Maryland’s counties to track and annually report growth-related indicators to MDP.⁹⁴

⁸⁸ <http://sgc.ca.gov/Grant-Programs/>

⁸⁹ <http://www.sgc.ca.gov/Grant-Programs/AHSC-Program.html>

⁹⁰ <http://www.mass.gov/hed/community/planning/chapter-40-r.html>

⁹¹ <http://database.aceee.org/state/transportation-system-efficiency>; see also:

http://www.azleg.gov/legtext/47leg/2r/summary/h.hb2294_03-01-06_asengrossedandpassedhouse.doc.htm

⁹² <http://database.aceee.org/state/transportation-system-efficiency>

⁹³ <http://database.aceee.org/state/transportation-system-efficiency>

Other Strategies

- Connecticut. Public Act 08-182 outlines new performance-based planning and programming requirements wherein actions must be consistent with the six Growth Management Principles, designating “Priority Funding Areas”⁹⁵
- Florida, 2009. Proposal to enact “mobility fees” to discourage new road construction by putting higher development fees on developments further from a city core^{96, 97}
- Massachusetts. Chapter 40R/40S substantially increase the supply of housing and decrease its cost, by increasing the amount of land zoned for dense housing.⁹⁸
- New Mexico. TDR Program is a voluntary, incentive-based, market-driven approach to preserving agricultural land, open space and other critical resources while encouraging development in designated County growth areas.⁹⁹
- Virginia. HB 2 developed prioritization processes to evaluate projects by: congestion mitigation, economic development, accessibility, safety, environmental quality and land use coordination (in areas with over 200,000 population).¹⁰⁰
- NE states. (Maryland, Delaware, Connecticut, New Jersey, Vermont, New York, Massachusetts, Pennsylvania, Maine) direct state funding to geographic areas designated for growth or infill development and constrain investments in areas designated for open space or rural preservation.¹⁰¹

Transportation Investments

State policies that direct investment toward three categories of transportation modes – bicycle, pedestrian, and transit service – have the potential to reduce VMT by encouraging a shift from driving. Here, the term “investment” refers to funding allocated toward infrastructure as well as non-infrastructure improvements such as planning, travel surveys, education, and outreach. The following subsection considers investment in bicycle and pedestrian programs together because policies are often similar or these modes are combined under one policy. The subsection on transit focuses on investment made by the states rather than the allocation of federal funding through the states. We do not discuss investment in highways because available research shows that increased highway capacity leads to *increases* in VMT.

⁹⁴ http://www.mass.gov/envir/smart_growth_toolkit/pages/state-policy.html

⁹⁵ http://www.ct.gov/opm/lib/opm/igp/org/cdupdate/2013-2018_cd_plan.pdf

⁹⁶ http://www.fdot.gov/research/Completed_Proj/Summary_PL/FDOT_BDK84%20977-02_rpt.pdf

⁹⁷ <http://www.fdot.gov/intermodal/mobility/MobilityFee.pdf>

⁹⁸ http://www.mass.gov/envir/smart_growth_toolkit/pages/state-policy.html

⁹⁹ https://www.santafecountynm.gov/growth_management/planning/tdr

¹⁰⁰ http://vasmartscale.org/documents/hb2_quick_guidev3.pdf

¹⁰¹ <http://www.georgetownclimate.org/files/report/report-tci-state-level-programs-policies-supporting-sustainable-communities.pdf>

Bicycle and Pedestrian Investments

Grant Programs

Research suggests that the connection between bicycle and pedestrian infrastructure and the amount of biking and walking are influenced by several factors, including infrastructure extent and quality, street network characteristics, and promotional programs available for travelers.¹⁰² The most common way for states to invest in active transportation is through grant programs that allocate funding to local governments. Several states have implemented grant programs for active transportation projects and programs. In 2013, California Governor Jerry Brown signed legislation creating the Active Transportation Program (ATP) (Senate Bill 99, Chapter 359 and Assembly Bill 101, Chapter 354). The ATP consolidates three existing federal and state transportation programs into a single grant program that allocates funding to infrastructure projects, plans, and non-infrastructure projects (education, encouragement, and enforcement) related to active transportation.¹⁰³ Similar to the ATP, Oregon's Active Transportation Section and Washington's Pedestrian and Bicycle Program serve as the statewide all-inclusive program that supports both infrastructure and non-infrastructure projects related to active transportation.^{104,105} Many state-level programs also offer grants specifically for bicycle and pedestrian infrastructure (*ConnectOregon*¹⁰⁶, Washington Small City Sidewalk Program¹⁰⁷, BikeBC¹⁰⁸) or non-infrastructure programs related to sustainable transportation in general (California Sustainable transportation Planning Grant Program¹⁰⁹, North Carolina Bicycle and Pedestrian Planning Grant Initiative¹¹⁰).

While states often directly invest in active transportation planning, we did not find a case where a state invested directly in infrastructure with the sole purpose of facilitating active transportation. However, state or national governments indeed have the power to invest in such projects. The Netherlands has constructed a ten-mile bicycle highway that connects two major cities, and Norway plans to construct 10 two-lane bike highways with a speed limit of 25 mph to facilitate long-distance commute.¹¹¹ The California Bicycle and Pedestrian Plan (2017) directs MPOs and the Division of Transportation Planning at Caltrans to explore opportunities for developing bike highways, although no source of funding has been identified at this stage.¹¹²

¹⁰² https://www.arb.ca.gov/cc/sb375/policies/bicycling/bicycling_brief.pdf, page 4-6

¹⁰³ [http://www.catc.ca.gov/programs/ATP/2017/Final Adopted 2017 ATP Guidelines.pdf](http://www.catc.ca.gov/programs/ATP/2017/Final_Adopted_2017_ATP_Guidelines.pdf)

¹⁰⁴ <http://www.oregon.gov/ODOT/TD/AT/Pages/index.aspx>

¹⁰⁵ http://www.wsdot.wa.gov/NR/rdonlyres/39192EFE-E71F-4B4B-83BD-535C9A896418/0/201719_LegislativeReport.pdf

¹⁰⁶ <http://www.oregon.gov/ODOT/TD/TP/Pages/bikepedplan.aspx>

¹⁰⁷ <https://www.wsdot.wa.gov/NR/rdonlyres/F061CF6D-7B96-4E61-BF20-50EAF2716997/0/BikePedPlan.pdf>

¹⁰⁸ <http://www2.gov.bc.ca/gov/content/transportation/funding-engagement-permits/funding-grants/cycling-infrastructure-funding>

¹⁰⁹ <http://www.dot.ca.gov/hq/tpp/grants/GrantGuideFY2017-18.pdf>

¹¹⁰ <https://connect.ncdot.gov/municipalities/PlanningGrants/Pages/Planning-Grant-Initiative.aspx>

¹¹¹ <http://www.citylab.com/cityfixer/2016/03/norway-bike-highways-billion-dollars/472059/>

¹¹² http://www.cabikepedplan.org/files/managed/Document/194/CSBPP%20DRAFT%202017-02-07_website.pdf

Complete Streets Policy

A complete street is a transportation facility that is designed and operated to provide safe mobility for all users. In most cases, states and local agencies utilize this concept to bring emphasis to the inclusion of facilities for pedestrian, bicycle, and transit vehicles, as complete streets facilitate such alternative modes of travel. The California Complete Streets Policy, for example, directs Caltrans to provide for the needs of all travelers of all ages and ability in all planning, programming, design, construction, operations, and maintenance activities on the state highway system. The goal of this policy is to improve safety, access, and mobility for all travelers in California, and recognize bicycle, pedestrian, and transit modes as integral elements of the transportation system.¹¹³ While most statewide complete streets policies such as those of California¹¹⁴, Washington¹¹⁵, Minnesota¹¹⁶, and Utah¹¹⁷ direct transportation agencies to address the needs of multi-modal travelers with no specific requirement or funding allocation, The Oregon Bike Bill (ORS 366.514), passed in 1971, requires the inclusion of pedestrian and bicycle facilities wherever a road, street or highway is built or rebuilt. It also requires the state and local jurisdictions to “spend reasonable amounts of their share of the state highway fund on facilities for pedestrian and bicyclists”.¹¹⁸

Bicycle and Pedestrian Planning and Tools

Investments in bicycle and pedestrian infrastructure are mostly made at the local level by cities and sometimes counties. In addition to grant programs, states can use planning tools to encourage such investments. California Department of Transportation (Caltrans) is in the process of finalizing the California State Bicycle and Pedestrian Plan (CSBPP). In addition to identifying goals, objectives, and strategies, the CSBPP evaluates Caltrans’ existing active transportation policies and programs related to transportation, and develops performance measures for the department’s future effort.¹¹⁹ States including Oregon, Washington, Minnesota, Massachusetts, North Carolina, and Virginia have created separate or combined statewide bicycle and pedestrian plans that aim to improve multi-modal safety and accessibility, encourage physical activity, and reduce VMT, congestion, and greenhouse gas emissions. In general, these plans provide background information, guidelines, strategies and measurement of success for active transportation planning and infrastructure projects. Some plans also identify sources of funding that may help to achieve the goals.

As an alternative to an all-inclusive statewide bicycle and pedestrian plan, the Utah DOT uses the Utah State Bicycle Plan to identify gaps in bicycle facility in each Utah DOT region and establish a procedure for regions to update their regional bike plan.¹²⁰ Interestingly, the Utah

¹¹³ http://www.dot.ca.gov/hq/tpp/offices/ocp/docs/dd_64_r2.pdf

¹¹⁴ http://www.dot.ca.gov/hq/tpp/offices/ocp/docs/dd_64_r2.pdf

¹¹⁵ <http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session Laws/House/1071-S.SL.pdf>

¹¹⁶ <http://www.dot.state.mn.us/policy/operations/op004.html>

¹¹⁷ <https://www.udot.utah.gov/main/uconowner.gf?n=10483007294967763>

¹¹⁸ https://www.oregon.gov/ODOT/HWY/BIKEPED/Pages/bike_bill.aspx

¹¹⁹ <http://www.cabikepedplan.org/About>

¹²⁰ <https://www.udot.utah.gov/main/uconowner.gf?n=16746106523524233>

Department of Health was the state agency that developed a Bicycle & Pedestrian Master Plan Design Guide, which does not identify any goals of its own but provides guidelines and resources to assist local agencies with producing their own bicycle and pedestrian plan.¹²¹

Education and Public Engagement

Research suggests that state actions to increase bicycle and pedestrian infrastructure would be most effective in reducing VMT if implemented in conjunction with promotional and educational programs (Pucher, et al. 2010). However, state-level education programs are often limited to a simple bicyclist safety manual, such as that of Oregon.¹²² But as a public engagement effort, Oregon also launched a smartphone app (ORcycle) that collects and shares route data and safety reports uploaded by bicyclists across the state.¹²³ Another significant bicycle education effort was made in North Carolina as part of the State's Safe Route to School Program. The Let's GO NC Pedestrian and Bicycle Safety Curriculum Program developed by North Carolina DOT provides online video lessons and downloadable lesson plans for instructors to educate elementary-aged children how to walk and bike safely.¹²⁴ With U.S. DOT funding, North Carolina also developed an event planning guide that helps educators to plan for a walk and bike to school event. In addition to information on how to event organization, this guide also includes resources for event participants or the schools to assess the quality of a community's active transportation infrastructure.¹²⁵

Besides state agencies, some non-profit organizations have been providing valuable active transportation education programs. Organizations such as Bike Utah and Bicycle Colorado have developed bicycle training programs that send instructors and equipment to schools across the state to provide in-person bicycle training for children. According to these organizations' websites, the 5-hour Utah Youth Bicycle Education and Safety Training Program aims to teach over 3,000 youths in Utah how to ride safely, and Bike Colorado's Safe Route to School project has reached over 87,000 students.^{126,127} Although these programs are currently administered by non-profit organizations, it is possible for state to incorporate such an education element as part of the active transportation programs.

Bicycle Purchase Incentives

As of the time of writing this report, no state in the U.S. has implemented incentives or subsidies for bicycle purchases; however, this strategy is widely adopted in Europe. Italy¹²⁸, France¹²⁹, Spain¹³⁰, and the City of Oslo in Norway¹³¹ offer or have offered citizens direct

¹²¹ http://choosehealth.utah.gov/documents/pdfs/Utah_Bike_Ped_Guide.pdf

¹²² http://www.oregon.gov/ODOT/hwy/bikeped/docs/bike_manual.pdf

¹²³ <https://www.pdx.edu/transportation-lab/orcycle>

¹²⁴ <https://www.ncdot.gov/bikeped/safetyeducation/letsgonc/>

¹²⁵ <https://connect.ncdot.gov/projects/BikePed/Documents/NCHowToPlan.pdf>

¹²⁶ <https://bikeutah.org/get-involved-2/youth-bicycle-education-program/>

¹²⁷ <https://www.bicyclecolorado.org/initiatives/safe-routes-to-school/>

¹²⁸ <http://www.copenhagenize.com/2009/05/italian-government-subsidizes-bicycles.html>

¹²⁹ <http://www.treehugger.com/bikes/france-offers-200-subsidy-electric-bike-purchases.html>

subsidies ranging from 200 to 1200 euros toward the purchasing of bicycles and/or electric bicycles. The United Kingdom also offers a scheme that allows people to borrow bicycles and safety equipment through their employers as a tax-free benefit, and the employees may purchase the bike for a discounted price after the rental period.¹³² In California, Santa Cruz County several years ago offered \$300 incentive for bicycles and \$500 for e-bikes; however, the program seems to have been discontinued.¹³³ In February 2017, the California Bicycle Coalition (Calbike) proposed a bicycle rebate program to the California Air Resources Board (CARB), which would allow citizens to deduct up to \$500 for a bicycle and up to \$1000 for electric bicycles. Calbike explained that the proposed cost of the program is \$10 million, a fraction compared to CARB's \$206 million Clean Vehicle Rebate Project.¹³⁴

U.S. Bicycle Routes and Recreational Trails

Several states also dedicate funding toward recreational bike trails. Although it is unclear how much utilitarian travel occurs on recreational bike trails, the potential exists for strategically located, high quality bike trails to facilitate the shift from driving to biking. For example, commuters may choose to utilize U.S. Bicycle Route 41 and 45 because they provide a high-quality bicycle path that connects Minneapolis and Saint Paul with northern suburban areas. In addition, recreational trails may help reduce recreational vehicle travel, promote local investment in bicycle infrastructure, and boost local economy. As suggested in the Minnesota Statewide Bicycle System Plan, the presence of a state bicycle route has prompted local decision makers to improve bicycle conditions in communities along the state bicycle route. The Minnesota DOT also provides a one-time technical assistance program for communities to perform a bicycle friendly community assessment and prepare a local Mississippi River Trail marketing action plan.¹³⁵ The State of Washington, which has been ranked as the most bicycle friendly state for eight years in a row, also dedicates funding toward recreational bike trail construction and maintenance through the Washington Wildlife and Recreation Program.¹³⁶

Other Policies

A number of policies do not currently lead to investments in active transportation projects but have the potential to do so. In Washington, for example, local agencies have the authority to collect bicycle registration and violation fees. Of this money, 75 percent must be used for building and maintaining bicycle paths and roadways or for reimbursing registration program or enforcement expenses. However, no local agencies in Washington currently collect these fees

¹³⁰ <http://www.eltis.org/discover/news/spain-offers-incentives-purchase-e-bikes>

¹³¹ http://www.citylab.com/commute/2017/01/oslo-norway-city-grant-for-electric-cargo-bikes/515100/?utm_source=nl_link6_020117

¹³² <https://www.cyclescheme.co.uk/get-a-bike/can-i-apply-for-cyclescheme>

¹³³ <http://www1.ucsc.edu/currents/01-02/12-03/bikes.html>

¹³⁴ <http://cal.streetsblog.org/2016/02/17/calbike-proposes-rebate-program-for-the-ultimate-zev/>

¹³⁵ <http://www.dot.state.mn.us/bike/system-plan/pdfs/statewide-bicycle-system-plan-final.pdf>, page 57

¹³⁶ <http://www.wsdot.wa.gov/News/2015/05/WABikeFriendlyState.htm>

primarily because the administrative fees would exceed 25 percent of funds collected.¹³⁷ Another example is the British Columbia New Building Canada Fund – Small Communities Fund. This program directs federal and provincial gas tax proceeds to eligible community-level projects including redevelopment, energy, transportation, and water treatment.¹³⁸ Although active transportation and public transit improvements do not take priority in the list of eligible projects, it would be justifiable to make give them priority because the source of funding is transportation related.

Table 3 Summary of State-Level Policy on Transportation Investments – Bike/Ped

State Grant Programs
<ul style="list-style-type: none"> ▪ California Active Transportation Program (ATP) ▪ California Sustainable Transportation Planning Grant Program ▪ Oregon Active Transportation Section ▪ ConnectOregon ▪ Washington Pedestrian and Bicycle Program ▪ Washington Small City Sidewalk Program ▪ North Carolina Bicycle and Pedestrian Planning Grant Initiative ▪ British Columbia BikeBC
Complete Streets Policy
<ul style="list-style-type: none"> ▪ California Complete Streets Program ▪ Oregon Bike Bill ▪ Washington Complete Streets Act ▪ Minnesota Complete Streets Policy ▪ - Utah Inclusion of Active Transportation Policy
Bike/Ped Plans and Planning Tools
<ul style="list-style-type: none"> ▪ California State Bicycle and Pedestrian Plan ▪ Oregon Bicycle and Pedestrian Plan ▪ Washington State Bicycle Facilities and Pedestrian Walkways Plan ▪ Minnesota Statewide Bicycle System Plan ▪ Minnesota Walks (Statewide Pedestrian System Plan) ▪ Massachusetts Bicycle Transportation Plan ▪ Massachusetts Pedestrian Transportation Plan ▪ North Caroline WalkBikeNC ▪ Virginia Bicycle and Pedestrian Program ▪ Virginia DOT State Pedestrian Policy Plan ▪ Utah State Bicycle Plan ▪ Utah Bicycle and Pedestrian Master Plan Design Guide

¹³⁷ <https://www.wsdot.wa.gov/NR/rdonlyres/F061CF6D-7B96-4E61-BF20-50EAF2716997/0/BikePedPlan.pdf>, page

18

¹³⁸ <http://www2.gov.bc.ca/gov/content/transportation/funding-engagement-permits/funding-grants/small-communities-fund>

Education and Public Engagement
<ul style="list-style-type: none"> ▪ Oregon OR Bicyclist Manual ▪ ORcycle, a smartphone app for cyclists ▪ North Carolina Let's Go NC Pedestrian and Bicycle Safety Curriculum ▪ North Carolina Event Planning Guide for Walk and Bike to School Day ▪ Utah Youth Bicycle Education and Safety Training Program ▪ Bicycle Colorado's Complete Bicycle and Pedestrian Education Program
Bicycle Purchase Incentives
<ul style="list-style-type: none"> ▪ UK Cycle Scheme ▪ Italy Bicycle Subsidy ▪ France E-Bike Subsidy ▪ Spain E-Bike Subsidy ▪ Norway Climate and Energy Fund (electric cargo bike subsidy) ▪ Santa Cruz County Bicycle Subsidy ▪ Proposed Bike Rebate Program through California Air Resources Board
Other
<ul style="list-style-type: none"> ▪ Minnesota Bike Routes (USBR 41, USBR 45) ▪ Washington Bicycle Registrations (put bike fees toward infrastructure. Not implemented) ▪ British Columbia New Building Canada Fund – Small Communities Fund (NBCF-SCF) (gas tax funding goes into various community projects)

Transit Investments

Direct Funding

Investments in transit service have the potential to reduce VMT by encouraging a shift from driving to transit. One of the most common ways for states to invest in transit is by allocating funding toward transit agencies. In some cases, states invest directly in transit projects through a state agency (e.g. California High-Speed Passenger Train Bond Fund, administered by the High-Speed Rail Authority¹³⁹). Nationally, much of the funding for intra-regional transit flows directly from the US DOT to transit agencies. In California, transit improvements are increasingly funded through county and regional sales tax measures.

Although the state role in promoting transit investments is more limited than it is for other modes, some states have created programs to allocate state funding toward transit. The California Transportation Development Act (TDA) established two funding sources for the state's public transportation services: Local Transportation Fund (LTF) and the State Transit Assistance fund (STA). These funds, derived from a ¼ cent statewide general sales tax and sales tax on diesel fuel, respectively, are allocated to areas of each county based on population,

¹³⁹ http://www.dot.ca.gov/docs/CA_Transportation_Financing_Package_2015-16.pdf, page 16

taxable sales, and transit performance. While LTF funding may be used for a wide range of transportation programs in addition to public transportation, STA funding can only be used for transportation planning and mass transportation purposes.¹⁴⁰ In 2014, the California Low Carbon Transit Operations Program was created to provide additional operating and capital assistance for transit agencies with a priority on serving disadvantaged communities. This program continuously appropriates five percent of the annual auction proceeds in the Greenhouse Gas Reduction Fund (Cap-and-trade proceeds).¹⁴¹ Additionally, California makes transit investments through the Public Transportation Account (FTA, funded by sales tax on diesel fuel), the Public Transportation Modernization, Improvement and Service Enhancement Account (funded by bond measure) and the California High-Speed Passenger Train Bond Fund (funded by bond measure).¹⁴²

States including New York, Colorado, and Virginia regularly allocate state funding for public transportation. The New York State Transit Operating Assistance (STOA) dedicates over \$5 billion toward the operation, capital improvement, and infrastructure spending.¹⁴³ The Colorado Funding Advancements for Surface Transportation and Economic Recovery Act of 2009 (FASTER) distributes approximately \$11 million collected through increased vehicle registration fees toward transit capital improvements, operating assistance, and metropolitan transit agencies.¹⁴⁴ In 2013, Virginia Senate Bill 1140 established a performance-based distribution process for the Commonwealth Mass Transit Fund. The performance metric is based on net cost per rider, customers per revenue hour, and customers per revenue mile.¹⁴⁵ Also in 2013, Colorado passed Senate Bill 48, which gave local governments the power to spend their portion of the \$250 million state's highway user's tax fund (collected through a 22-cent-per-gallon fuel tax and vehicle registration fees) on an assortment of transit and bicycle/pedestrian projects.¹⁴⁶

Transit Plans

California is in the process of developing the California Statewide Transit Strategic Plan.¹⁴⁷ States including Washington¹⁴⁸, Colorado¹⁴⁹, Minnesota¹⁵⁰, and South Carolina¹⁵¹ have developed statewide transit plans. These plans are used to identify goals and lay out the strategic framework for the implementation and funding of transit projects across the state. As

¹⁴⁰ http://www.dot.ca.gov/hq/MassTrans/Docs-Pdfs/STIP/TDA_4-17-2013.pdf

¹⁴¹ <http://www.dot.ca.gov/drmt/splctop.html>

¹⁴² http://www.dot.ca.gov/docs/CA_Transportation_Financing_Package_2015-16.pdf, page 8, 14, 16

¹⁴³ https://nytransit.org/images/positionpapers/2016/Budget_Analysis_4.4.16.fd.pdf

¹⁴⁴ <https://www.codot.gov/programs/transitandrail/transit/transit-grant-programs>

¹⁴⁵ http://www.hrtpo.org/uploads/docs/TTAC100213/P13-Transit_Performance_Metrics.pdf, page 7

¹⁴⁶ <http://www.denverpost.com/2013/05/05/colorado-road-money-can-now-be-used-on-transit-projects/>

¹⁴⁷ <http://www.dot.ca.gov/drmt/spstsp.html>

¹⁴⁸ http://www.wsdot.wa.gov/NR/rdonlyres/EF00F16E-472D-43FE-AFF6-935DF809274B/0/WashingtonStatePublicTransportationPlan_Section50871816optimized.pdf

¹⁴⁹ <https://www.codot.gov/programs/transitandrail/statewidetransitplan>

¹⁵⁰ <http://www.dot.state.mn.us/transit/reports/transit-report/pdf/greater-mn-transit-plan.pdf>

¹⁵¹ http://www.scdot.org/multimodal/pdf/SC_MTP_Transit_Plan.pdf

a general trend, states aim to expand their public transit network, improve mobility for all individuals and communities, improve the efficiency and customer experience of the transit system, and prioritize funding for transit services and infrastructures. Some plans also include information on the current state, challenges, and sources of funding for transit improvements.

To facilitate the state's transit plan, Minnesota DOT also developed the Greater Minnesota Transit Investment Plan, which supports the state transit plan by presenting a series of investment strategies to achieve the vision. The investment plan also includes a more in-depth analysis on the current transit services, markets with unmet demand, sources of funding, a performance measure, and a prioritization matrix for all strategies identified.¹⁵² Similarly, Washington prepared a four-page document that identifies specific near-term actions that should be taken in order to meet the goals set by the state public transportation plan.¹⁵³

Other Strategies

The impacts of transit investments on VMT are likely to be higher in cases where the investments target "choice" riders, including higher-income riders, off-peak and non-commute trips, and small cities and suburban areas.¹⁵⁴ Some states have invested in alternative transit programs to attract people who might otherwise choose to drive alone. To transport long-distance commuters to and from Denver, Colorado DOT funds and manages Bustang, an interregional express bus service. Bustang runs during peak commute hours Monday through Friday along the busy I-25 and I-70 corridors. The bus fleet, operated by a contracted coach bus company, is comprised of 13 coach buses servicing three routes. Each bus has a 50-passenger capacity and offers features such as wheelchair accessibility, on-board Wi-Fi, restrooms, bike racks, and charging outlets. Single-ride fare ranges from \$5 to \$28, and various discounted ticket packages are available.¹⁵⁵

In 2008, lawmakers in Illinois approved a long-term mass transit funding bill that provides free transportation to Illinois seniors (over 65 years old). This legislation provides \$494 million in new and recurring funding to Chicago Metro Area transit agencies, and another \$50 million to transit agencies outside of the Chicago area.¹⁵⁶

¹⁵² <http://www.dot.state.mn.us/transitinvestment/pdf/gmtip-public-comment-draft.pdf>

¹⁵³ http://www.wsdot.wa.gov/NR/rdonlyres/F587CB10-BFC3-4E22-A757-0C5C88701B24/0/20160614_WSPTPEarlyActions.pdf

¹⁵⁴ https://www.arb.ca.gov/cc/sb375/policies/transitservice/transit_brief.pdf, page 6

¹⁵⁵ <https://www.codot.gov/travel/bustang>

¹⁵⁶ <http://www.ilga.gov/legislation/95/HB/PDF/09500HB0656lv.pdf>

Table 4 Summary of State-Level Policy on Transportation Investments - Transit

Direct Funding
<ul style="list-style-type: none"> ▪ California Transportation Development Act (TDA) ▪ California State Transit Assistance (STA) ▪ California Public Transportation Account (PTA) ▪ California Public Transportation Modernization, Improvement and Service Enhancement Account ▪ California Low Carbon Transit Operations Program (LCTOP) ▪ High-Speed Passenger Train Bond Fund (Proposition 1A) ▪ New York State Transit Operating Assistance ▪ Colorado Transit Grant Program ▪ Colorado Highway Users Tax Fund ▪ Virginia SB1140 Performance-Based Funding for Public Transportation
Transit Plans
<ul style="list-style-type: none"> ▪ California Statewide Transit Strategic Plan ▪ Washington Statewide Public Transportation Plan ▪ Colorado Statewide Transit Plan ▪ Greater Minnesota Transit Investment Plan ▪ Greater Minnesota Transit Plan ▪ South Carolina Statewide Public Transportation and Coordination Plan
Other Strategies
<ul style="list-style-type: none"> ▪ Colorado Bustang ▪ Illinois Providing Free Public Transportation for Senior Citizens

Transportation Demand Management Programs

Transportation demand management (TDM) programs encompass a variety of strategies, including employer-based trip reduction (EBTR) programs, telecommuting programs, and voluntary travel behavior change programs. Car-sharing services might also play a role in managing demand. Most TDM programs aim to reduce congestion and greenhouse gas emissions by reducing single-occupant car travel to work, and they are most applicable in metro areas. TDM programs are generally implemented by large employers in response to state or local requirements or financial incentives, although some applications appropriate for rural areas.

EBTR and Telecommuting Programs

State-level TDM programs often include EBTR and telecommuting components. Although TDM programs can be applied to employers statewide (Commuter Choice Maryland¹⁵⁷), most state-level TDM programs limit their application to certain metropolitan areas (Oregon Employee Commute Options¹⁵⁸ and Washington Commute Trip Reduction Act¹⁵⁹) or certain employers (Colorado Greening Government¹⁶⁰). Many states also have stand-alone programs in place to offer state employees a telecommute option, including California and Massachusetts.^{161,162}

In general, TDM programs mandate employers that fit certain criteria to offer options such as subsidized carpooling or vanpooling, carpooling assistance, compressed work week, telecommuting, or discounted or free transit passes to employees. Alternatively, programs such as the Commuter Choice Maryland and the now-expired Oregon Business Energy Tax Credit program incentivize EBTR by offering tax credit to employers who purchase carpooling vehicles or transit passes.¹⁶³ In most cases, TDM programs do not evaluate its success by setting a hard goal or standard. Rather, they regulate or evaluate employer's effort to implement such programs (Oregon Employee Commute Options, California Bay Area Commuter Benefits). The Colorado Greening Government Executive Orders, however, sets a goal of reducing petroleum use by 25%. Because this program is implemented on state government employers, the state can invest more resources in order to achieve the goal (e.g. purchase electric work vehicles).

Although California has not implemented a state-level EBTR program, many regions have experimented with EBTR programs in effort to reduce congestion and harmful emissions. In 1988, the now-expired Southern California's Regulation XV required employers with work sites of more than 100 employees to develop employee trip reduction plans. In 2009, San Joaquin Valley Air District adopted a commute-trip reduction program (eTrip), and the Bay Area Air Quality Management District adopted the Bay Area Commuter Benefits Program in 2013.¹⁶⁴ In 2016, New York City implemented Commuter Benefits Law, which requires qualified employers to offer employees the opportunities to purchase transportation fringe benefits using pre-tax income.¹⁶⁵

Federal policy has supported TDM efforts in a variety of ways. The Federal Consolidated Appropriations Act of 2015 provides tax benefits to commuters. Commuting employees may pay for work-related parking or transit/vanpool expenses with up to \$550 in pre-tax income per month, \$225 in each category.¹⁶⁶ The Telework Enhancement Act of 2010 requires each

¹⁵⁷ http://commuterchoicemaryland.com/emp_programoptions.htm

¹⁵⁸ http://arcweb.sos.state.or.us/pages/rules/oars_300/oar_340/340_242.html

¹⁵⁹ <http://www.wsdot.wa.gov/Transit/CTR/overview.htm>

¹⁶⁰ https://www.colorado.gov/pacific/sites/default/files/Vehicle_Miles_Reduction_Guidelines.pdf

¹⁶¹ <http://www.dgs.ca.gov/dgs/ProgramsServices/telework.aspx>

¹⁶² <http://www.mass.gov/anf/employment-equal-access-disability/hr-policies/alt-work-options/telecommuting/telecommuting-policy.html>

¹⁶³ http://www.lanepowell.com/wp-content/uploads/2009/04/kimmelfieldn_012.pdf

¹⁶⁴ https://www.arb.ca.gov/cc/sb375/policies/ebtr/ebtr_brief.pdf

¹⁶⁵ <https://www1.nyc.gov/site/dca/about/commuter-benefits-FAQs.page>

¹⁶⁶ <https://www.nctr.usf.edu/programs/clearinghouse/commutebenefits/>

Executive agency to establish and implement a policy under which employees are authorized to telework.¹⁶⁷

Other Strategies

Ride sharing has become an increasingly popular TDM strategy. State-led ride sharing programs such as the Connecticut CTrides and the Delaware Rideshare go beyond specific employers or locations to offer ride matching, vanpool services, or information on travel resources to commuters working or living in the entire state.^{168,169} Many TDM and ride share services also offer a “guaranteed ride home,” which allows commuters who miss their regular ride to receive reimbursement for the cost of alternate transportation. In some cases, ride sharing programs also work with employers to start a TDM program at their workplace.

Other programs target awareness. The Drive Less Save More program launched by Oregon department of Transportation and other partners in 2006 aims to raise general awareness about reducing driving and promoted alternative modes of transportation, including carpooling, telecommuting, riding transit, biking and walking. The campaign was reported to have reduced 21.8 million vehicle road miles by 2009.¹⁷⁰ New York has formed a public-private partnership to develop a program that integrates information on many aspects of the driving experience into a device called Drive Smart.^{171,172} This device provides drivers with information that helps that to drive more safely and save both time and money.

Table 5 Summary of State-Level TDM Policies

EBTR and Telecommuting Programs
<ul style="list-style-type: none">- Oregon Employee Commute Options (ECO) Program- Washington Commute Trip Reduction (CTR) Law and CTR Efficiency Act- Colorado the Greening Government Executive Orders- Maryland Commuter Choice Maryland- Massachusetts Telecommuting Policy- California Statewide Telework- California Employer-Based Trip Reduction Program (Being Evaluated)- Oregon Business Energy Tax Credit Program (Expired)

¹⁶⁷ <https://www.telework.gov/guidance-legislation/telework-legislation/legislation/>

¹⁶⁸ <http://ctrides.com/about-ctrides>

¹⁶⁹ <http://ridesharedelaware.org/about-rideshare-delaware/>

¹⁷⁰ <http://drivelessavemore.com/about-us>

¹⁷¹ <http://www.nyc.gov/html/dot/html/pr2015/pr15-090.shtml>

¹⁷² https://ops.fhwa.dot.gov/congestionpricing/value_pricing/projects/not_involving_tolls/pay_drive/ny_drive_smart_mtp.html

EBTR and Telecommuting Programs at Other Levels of Government
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|---|
| <ul style="list-style-type: none">- California The Bay Area Commuter Benefits Program- California San Joaquin Valley eTrip- New York City Commuter Benefits Law- California South Coast AQMD Regulation XV (Expired)- Consolidated Appropriations Act (commute tax benefits)- The Telework Enhancement Act of 2010 |
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Other Strategies

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| <ul style="list-style-type: none">- Connecticut CTrides- Delaware RideShare- Oregon Drive Less Save More- New York Drive Smart |
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