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Reducing greenhouse gas emissions from transportation and land use: Lessons from West Coast states

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Abstract: Planners and policymakers in the United States increasingly recognize climate change as a critical challenge. Because the transportation sector accounts for one-third of all greenhouse gas emissions (GHGs) linked to climate change, some states—including California, Oregon, and Washington—have passed legislation to reduce GHGs from transportation. Much of the work to date has focused on modeling impacts and evaluating performance of different strategies. Instead, this paper focuses on policy adoption and implementation. This research relies on document analysis and stakeholder interviews to examine state efforts to reduce GHGs by examining goals, plans, actions, and results. While these states have all established statutory goals to reduce GHGs, planning, implementation, and monitoring vary across states. California and Oregon rely on state- and metropolitan-level planning, while Washington relies on a state approach. California has enacted funding programs to implement strategies to achieve reductions and worked to reduce regulatory barriers to compact development. All states monitor levels of GHGs, but the impact of plans is often unexamined. Though West Coast states have taken initial steps to enact goals and require scenario plans, states must provide funding or regulatory relief while improving monitoring in order to achieve ambitious goals to reduce GHGs from transportation.

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1 Introduction

Planners and policymakers in the United States increasingly recognize climate change as a critical challenge. Although there is not yet a comprehensive federal response, several states have adopted ambitious goals to reduce greenhouse gas emissions (GHGs) linked to climate change. To achieve their goals, these states have adopted plans and implementation mechanisms, or delegated authority to the regional or local level. GHGs from the transportation sector constitute approximately one-third of all emissions

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in the U.S. (U.S. EPA, 2015). Reducing GHGs from transportation rests on the "three-legged stool" of vehicle efficiency, fuel content, and vehicle miles traveled (VMT; Ewing, Bartholomew, Winkelman, Walters, & Chen, 2007). Even with significant improvements in vehicle efficiency and fuel content, increasing VMT is expected to outweigh such gains. Total VMT generally rises with increasing population. Moreover, at least until recently, VMT per capita has been rising as communities grow in size and people tend to take more and longer trips, leading to total VMT growing faster than population. Recent data shows that VMT per capita is beginning to increase again following the Great Recession, especially in western states, although VMT has not risen to pre-Great Recession levels in all states (U.S. Federal Highway Administration, 2015). Acknowledging this connection, several state-level strategies involve reducing GHGs (and VMT) by shifting transportation modes and promoting compact development patterns. Unlike many of the strategies related to vehicle efficiency and fuel content, which may be achieved through top-down federal action, reducing VMT requires changes in individual choices. Although concerns about climate change provide an additional reason, for several decades some states have been using transportation planning to promote alternative modes and land-use planning to encourage compact development. In this study, the authors examine how the three West Coast states—California, Oregon, and Washington—adopted policies to reduce GHGs from the transportation sector by reducing VMT. This study focuses on West Coast states because all three states have passed legislation related to reducing GHGs. While previous research has examined climate action plans in general or focused on modeling and evaluating relative performance of various strategies, previous studies have not focused on the policy implementation of strategies to reduce GHGs from transportation.

This study proceeds as follows: First, the authors summarize research on reducing GHGs from transportation, the link between VMT and compact development, and state climate action plans. Then, this study offers a conceptual framework explaining the process for setting targets, adopting plans, taking action, and reducing GHGs. Next, this study summarizes the approach in each state, first examining goals and then plans, actions, and results. Then, information from the three case study states is synthesized, summarizing key similarities and differences among state approaches and describing key strengths and weaknesses based on interviews. Finally, key lessons learned from efforts in California, Oregon, and Washington are described.

2 Background

Currently, transportation end-use sector emissions constitute approximately 27% of GHGs from fossil fuel combustion in the United States. Approximately 62% of transportation sector emissions come from passenger cars or light-duty vehicles while the remainder come from freight, aircraft, rail, ships, and boats. From 1990 to 2012, transportation emissions rose by 18% while VMT increased by 35% (U.S. EPA, 2015).

Emissions from transportation can be represented by a three-legged stool consisting of vehicle technology, fuel content, and VMT (as shown in Figure 1). Ewing and colleagues (2007) offer a framework for considering how to reduce GHGs from transportation. According to Ewing and colleagues (2007), even if the federal government adopts stringent standards for fuel economy (Corporate Average Fuel Economy or CAFE standards) and fuel content changes, rising VMT will outweigh gains in these two sectors. Thus, to reduce transportation emissions, it is important to focus on reducing VMT. Acknowledging this connection, several state-level strategies involve reducing GHGs by shifting transportation modes and promoting compact development patterns. Unlike many of the strategies related to vehicle efficiency and fuel content, which may be achieved through top-down federal action, reducing VMT requires changes in state or local policy and individual choices. Research has shown that VMT can be reduced by encouraging use of other transportation modes (e.g., transit, biking, and walking); by mak-

ing driving more expensive through pricing (e.g., carbon tax); and by altering land use so destinations are closer together (e.g., higher density). Behavior change is necessary to reduce VMT. The bolded text in the boxes in Figure 1 illustrates the focus of this study.

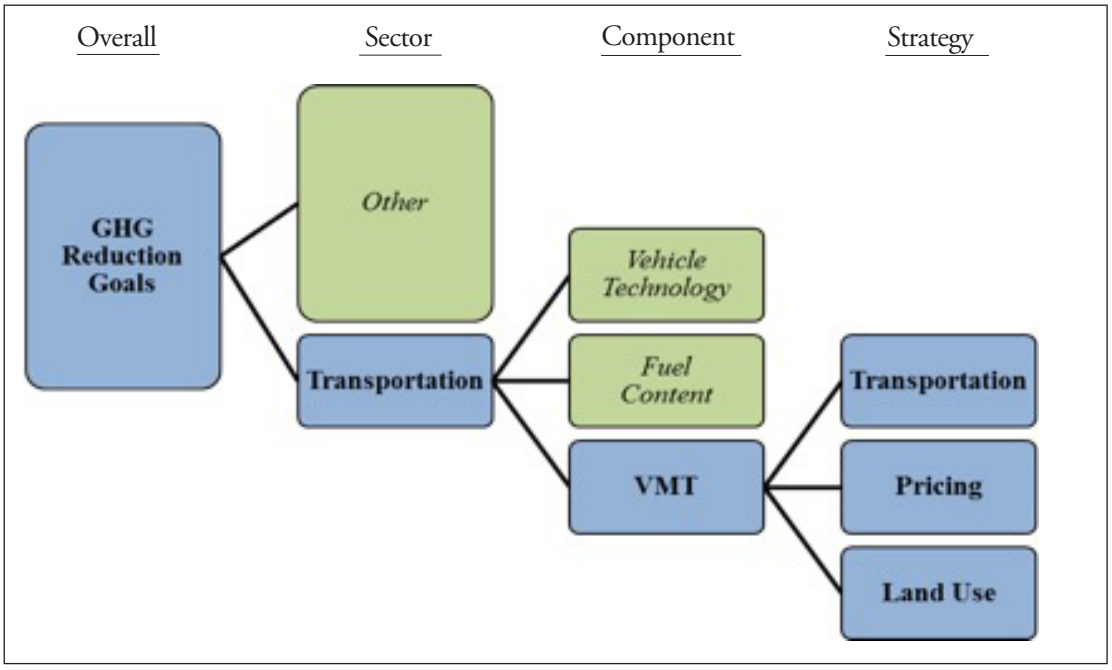

Figure 1: Reducing greenhouse gas emissions (GHGs) from transportation

Rather than relying on the three-legged stool, some scholars have relied on the "Comparative study on Urban Transport and the Environment" (CUTE) framework to analyze measures to reduce carbon emissions from transportation (Nakamura & Hayashi, 2013). The CUTE matrix includes three strategies: 1) reduce unnecessary travel demand (AVOID); 2) shift travel to lower-carbon modes (SHIFT); and 3) improve the intensity of carbon-oriented modes (IMPROVE). Nakamura & Hayashi (2013) focus on how countries rely on instruments to reduce unnecessary travel demand and shift travel to lower-carbon modes; these instruments include technology, regulation, information, and economy. This framework is slightly different than the three-legged stool offered by Ewing as AVOID and SHIFT are both strategies to reduce VMT.

To examine previous research on reducing GHGs from transportation and state policy to reduce GHGs, the authors rely on three primary areas of research. First, the authors describe research from the transportation modeling literature that examines approaches to reduce GHGs from transportation generally. Then, the authors summarize studies that establish the connection between reducing VMT and altering development patterns. Finally, the authors summarize previous studies that assess state climate action plans. The authors close this section by describing how this study fills a research gap.

2.1 Reducing GHGs from transportation

An area of research relies on modeling to consider the relative impact of various policy approaches for reducing emissions from transportation. Rodier (2009) examines the international modeling literature on land use, transit and pricing policies to examine how these policies might reduce VMT (and thus GHGs) if implemented. Examining various time periods over 10-40 years, Rodier (2009) examines how transportation, land-use, and transit policies work independently and in combination, suggesting that

combined land use, transit, and pricing measures bring greater reductions in the near- and longer-term time horizons. However, this research cautions that it is difficult to generalize from international models because of vast differences in the availability of alternative modes and land-use patterns (Rodier, 2009). Ford, Dawson, Blythe and Barr (2018) study how land-use and transport models can be integrated with greenhouse gas emissions to gain an understanding of the impacts of land-use and transport policies. Ford et al. (2018) conclude that recent developments in integrating models can better represent social and technological change to assess the climate impacts of land-use and transport policies.

Many studies focus on modeling using parameters to determine relative impacts of each policy option. Using the CUTE framework described above, Nakamura and Hayashi (2013) describe different strategies within the framework, but conclude that the stage of development within each country affects which policies are appropriate for reducing emissions. Nakamura and Hayashi (2013) also note that low-density, car-dependent cities may want to focus on IMPROVE measures and low-emission vehicles instead of AVOID and SHIFT measures. Interestingly, the U.S. states discussed in this paper emphasize mitigation and reducing VMT over focusing on the carbon-content of fuel (an IMPROVE measure) because federal policy affects fuel standards. Hammadou and Papaix (2014) examine the efficiency, equity, and acceptability of policy tools for reducing emissions, focusing on low-emissions zones, congestion tolling, parking charging, and public transit fares. Hammadou and Papaix (2014) show that the tools have dissimilar distributive effects, reiterating previous findings (Nakamura & Hayaski, 2013; Rodier, 2009), and affirming that there is no one-size-fits-all approach to reducing GHGs from transportation.

Many modeling exercises rely on a "what would it take" framework of determining what policies would need to be implemented to achieve emission reductions by a certain year (Hickman, Ashiru, & Banister, 2010; Crozet & Lopez-Ruiz, 2013). These exercises often focus on hypothetical policy changes that might lead to reductions but overlook the political challenges to implementing such policies. Other scholars (Pollak, Meyer, & Wilson, 2011) have examined the political barriers to implementing various policies by surveying state-level climate action group participants about perceived barriers to implementation. Pollak and colleagues (2011) found that consumer behavior and public acceptance were the most significant barriers to reduced vehicle usage.

Morrow, Gallagher, Collantes, and Lee (2010) rely on the general equilibrium model of U.S. energy markets to examine how policies addressing fuel taxes, fuel economy standards, tax credits for new vehicles and pricing affect GHGs. This study examined the effectiveness of various policies to reduce GHGs from transportation, finding that the greatest reductions come from increasing the cost of driving, which would diminish the growth in VMT (Morrow et al., 2010). The findings reiterate the importance of policies to reduce VMT rather than focusing on fuel economy or fuel type alone.

Su (2017) focuses on specific types of policies in the U.S. using existing data from the National Household Travel Survey, rather than models. Examining travel demand management policies like parking management, promoting transit and carpools, and employer travel demand management programs, Su (2017) finds that these policies have a negative impact on emissions but notes that doubling density has a significant impact and that many of the effects are cumulative when applied together.

In sum, the three-legged stool provides three ways to reduce GHGs from transportation: vehicle efficiency standards, fuel type, and vehicle miles-traveled. Ewing and colleagues (2007) note that gains in vehicle efficiency and altering fuel type alone will not reduce GHGs from transportation. Much of the research has relied on modeling to evaluate the relative effectiveness of different policies, but scholars note that context is very important, so evaluating individual policy options universally is difficult (Rodier, 2009; Hammadou & Papaix, 2014; Nakahara & Hayaski, 2013). To date, few studies have examined the political barriers to reducing GHGs from transportation (Pollak, Meyer, & Wilson, 2011).

2.2 Reducing VMT

Several scholars have explored the connection between VMT and development patterns. Several studies describe the relationship between VMT and urban form discussing density, diversity, and design (Ewing & Cervero, 2003; Crane, 2000). Recent studies summarize the relationship between VMT and development patterns, finding that compact development reduces VMT by 20–40%. Doubling residential density reduces VMT by 5–12% but combining with mixed use and transportation options reduces VMT by up to 25% (Ewing et al., 2007; Cambridge Systematics & Urban Land Institute, 2009; National Research Council, 2009). In one comparative study, Zhang, Hong, Nasri, and Shen (2012) examine the impact of the built environment on VMT in four case studies, finding that compact, mixed-use, small-block, and infill development can reduce VMT per person. This study does not provide a full description or critique of the variation in the range of findings on the connection between VMT and development, but refers to the literature to provide support for the assumption that development patterns impact VMT. The state policy approaches considered here rely heavily on the assumption that land use and development patterns are important approaches to reducing VMT.

2.3 State climate action plans

To plan for reducing GHGs, several states have adopted state climate action plans. As of 2014, approximately 32 states have created state climate action plans, and 29 states have adopted some type of GHG reduction goal (U.S. EPA, 2015; U.S. Department of State, 2014). To meet GHG reduction goals, states include a broad spectrum of policies covering energy efficiency and renewable energy, and many of these climate action plans include GHG reduction strategies related to transportation. Among GHG reduction strategies, "efficient vehicles" and "reduced fuel use" are the fourth and fifth most popular strategies in state climate action plans, respectively (Pollak, Meyer, & Wilson, 2011). Research on the effectiveness of state climate plans has been limited, but Drummond (2010) relied on regression models to examine how climate plans impact per capita CO2 emissions from residential, commercial, transportation, and nonindustrial end users from 1990–2007. Drummond (2010) found that state-level climate actions reduce GHGs by a modest amount and notes that vehicle efficiency standards are one of the most effective policies for reducing GHGs from transportation, which counters some of the research on modeling and conflicts with the key approach pursued by the states examined in this study.

A few scholars have offered assessments of state climate action plans and offered guidance for improving state climate action plans. In assessing the first generation of municipal and state climate action plans, Wheeler (2008) identified key weaknesses in early plans: inadequate goals; lacking strong actions; and lacking institutional and political commitment. Wheeler recommends stronger near-term goals, robust monitoring and progress reporting, a broader range of actions, and changing policies, regulations and incentives to reduce emissions, moving beyond existing actions. Gallivan, Ang-Olson, and Truchetta (2011) examined the integration of climate change into state and regional transportation plans, examining 12 departments of transportation (DOTs) and 18 metropolitan planning organizations (MPOs), finding that the level of integration varied across state and regions. Other scholars have synthesized the research on climate change and transportation research at state agencies and universities (ICF International, 2011). Many of these articles provide guidance for selecting greenhouse gas reduction strategies but overlook the challenge of implementation and agency coordination. A few short TR News articles discuss various approaches to implementation in U.S. States. Specifically, a 2012 issue of TR News examined state and local action on climate change, focusing on agency implementation (Noland & Burbank, 2012; Johnson, Annelin, & Schuster, 2012; Campoli, 2012). Turner, Frazier, and

Kaiser (2009) outline the course of action for implementation and predict potential challenges. Barbour and Deakin (2012) evaluate the progress implementing Senate Bill 375 in California, focusing on the local and metropolitan level.

2.4 Gaps in the literature

In sum, some scholars have provided different frameworks for considering how to reduce emissions from transportation (Ewing et al., 2007; Nakamura & Hayashi, 2013). These frameworks help researchers understand how compact development, alternative transportation modes, and pricing can influence VMT and reduce GHGs. Further, there are three bodies of literature that guide this research on transportation, land use, and climate change planning at the state level. In considering how to reduce GHGs from transportation, some scholars have focused on modeling the impacts of various policies on GHGs. Several scholars examine how reducing VMT can reduce GHGs. But existing research focuses on quantitative approaches to measure the impact of GHG reduction strategies. There is limited qualitative research on the policy framework for transportation and land-use strategies to reduce GHGs. Finally, while several states have created climate action plans, there is some limited research on the first generation of these plans. This research seeks to fill the gap in existing literature by focusing on the policy framework for reducing GHGs and examining how transportation and land use reduce GHGs to reach climate goals. In this study, the authors focus on policies to reduce VMT and examine whether states have put policies in place that may reduce GHGs from VMT.

3 Methodology and conceptual framework

States aiming to reduce GHGs generally follow a consistent process. To examine how states implement policies to reduce GHGs from transportation, the authors examined goals, plans, actions, and results (see Figure 2). States set goals for reducing GHGs, or closely related quantities such as VMT. In our case study states, each governor pressed their legislature to adopt such goals into law. Furthermore, our case study states have adopted specific targets for reducing GHGs from transportation.

To make progress towards these goals, jurisdictions create plans, including strategies and policies for reducing GHGs. In some cases, these plans are statewide and created by state agencies, but in some states this authority is delegated to regional or local governments. There is considerable variation in these "plans" across states. California adopted a comprehensive state-level plan (California Air Resources Board, 2014). Oregon and Washington have drafted but not formally adopted interim comprehensive documents (Oregon Global Warming Commission, 2010; Washington State Dept. of Ecology & Washington State Community, Trade and Economic Development Dept., 2008). States may also update long-range transportation plans to convey strategies for reducing GHGs from the transportation sector.

Based on the strategies adopted in plans, jurisdictions take actions in the form of regulations, processes, incentives, or financial investment. Examples include investing in multi-modal transportation, transportation demand management, technological improvements, and planning for compact development. Some states have adopted implementation mechanisms, like funding or regulatory relief, to aid in reducing GHGs. For example, California uses cap-and-trade to fund implementation. Additionally, some states had pre-existing programs in place that aid in reducing GHGs, though reducing GHGs was not the core focus of the programs. Plans and actions together represent the efforts the state is taking to reduce GHGs from transportation.

Such efforts are intended to produce results (i.e., a reduction of GHG). To monitor progress towards goals, jurisdictions monitor GHGs and produce regular monitoring reports as required by law. This conceptual framework is conveyed in Figure 2 and further described for each state in the next section.

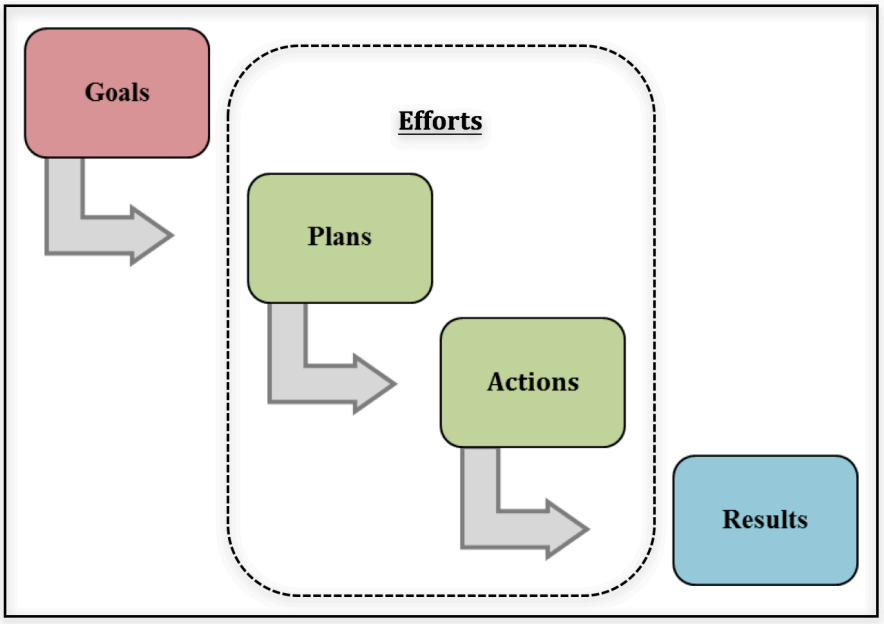

Figure 2: Conceptual framework

This project relies on document analysis and qualitative research methods to evaluate state efforts to integrate transportation and land-use planning to reduce GHGs from transportation. First, researchers examined statutes and analyzed state-level transportation, land use, and climate plans; regulations; other plans and programs; and interim progress reports to obtain an understanding of relevant climate, transportation, and land-use legislation and plans. Next, between December 2014 and July 2015, the research team conducted confidential semi-structured interviews with state agency staff and other stakeholders, including MPOs, local and regional associations, and nongovernmental advocacy organizations. Interviewees were chosen to represent the agencies, associations, and nongovernment advocacy organizations involved with planning, implementation, and monitoring of state statutes, policies, and programs centered on reducing GHGs from transportation. Researchers originally used their professional networks and document analysis to identify initial interviewees and then relied on snowball sampling from the initial interviews to identify additional interviewees. The research team conducted interviews with 34 individuals in person or via phone.[1] Following the conceptual framework summarized in Figure 1, the authors asked each stakeholder about goals, plans, actions, and results in their state. The conceptual framework was broad enough to enable researchers to probe different aspects of each state's approach without prejudging what might be learned. Interviews focused on understanding the policy framework within each state and investigating the strengths, weaknesses, and best practices from each state. Interview questions were slightly adapted for each individual interview to reflect variation in policy across states and variation in roles across interviewees. Appendix A presents sample interview questions.

4 State approaches

This section is organized along the conceptual framework to compare and contrast the policy approaches within each state. To compare the high-level policy choices, Table 1 summarizes each state's policy choices in setting GHG reduction targets for light-duty vehicles and includes a description of the planning required within each state. Each of our case study states used a different process for setting targets:

[1] The researchers conducted 13 interviews with 18 individuals in California, 10 interviews with 13 individuals in Oregon, and 11 interviews with 17 individuals in Washington.

California took a bottom-up approach; Oregon a top-down approach; and Washington simply legislated targets. California and Oregon have separate targets for each MPO, whereas Washington has just statewide targets. California and Oregon's targets are tied to GHGs, allowing MPOs to achieve targets through a combination of VMT reduction and other strategies; Washington's targets are tied to VMT. California and Oregon set targets relative to a baseline year (2005); Washington's targets are relative to a business-as-usual projection for 2020. Finally, in California all MPOs are required to create plans (Sustainable Communities Strategies) to meet the targets; in Oregon, only the largest MPO (Portland) is required to do so; and, in Washington, targets do not apply at the MPO level. For all of our case study states, targets are expressed as percentage changes in per capita values. By 2011, each state had adopted such targets.

Table 1: Policy choices in setting GHG reduction targets for light-duty vehicles

Aspect	Choice	Description	California	Oregon	Washington
Process	**Legislated**	Legislate targets without modeling how these relate to statewide GHG goals			X
	Top-Down	Use modeling to set targets to be consistent with statewide GHG goals		X	
	Bottom-Up	Set targets based on what is technically / economically / politically feasible	X		
Geography	**Statewide**	Set a single target for entire state			X
	By MPO	Set different targets for each MPO	X	X	
Quantity	**GHG**	Measure reductions in GHG as a result of local actions	X	X	
	VMT	Measure reductions in VMT			X
Representation	**Absolute**	Target an absolute level to achieve			
	Relative	Target a percentage reduction from some reference	X	X	X
Metric	**Total**	Measure total levels (sensitive to population changes)			
	Per Household	Measure levels per household (insensitive to population changes)			
	Per Capita	Measure levels per capita (insensitive to population changes)	X	X	X
Reference	**Baseline**	Measure changes compared to a past baseline year	X	X	
	Trend	Measure changes compared to the business-as-usual trend in some future year			X
Obligation	**Mandatory**	Each MPO is required to adopt a plan to meet its target	X		
	Voluntary	Each MPO may choose to pursue its target		X	X

4.1 Goals

In 2004, the West Coast Governors' Global Warming Initiative released a report urging California, Oregon, and Washington to adopt comprehensive goals for reducing GHGs (West Coast Governors' Global Warming Initiative, 2004). By 2007, each state had adopted such goals for reducing total statewide GHGs by various times to various levels compared to the 1990 base year. Table 2 summarizes the statewide GHG reduction goals and light-duty vehicles reduction targets. More details on each state's goals and targets are provided below. The states have taken different approaches to setting targets for reducing GHGs from light-duty vehicles weighing less than 10,000 pounds (Michele, n.d.).

Table 2: Statewide GHG reduction goals and light-duty vehicle reduction targets

State	Year	Statewide GHGs Goals (relative to 1990)	Light-Duty Vehicle Targets	Key Legislation
California	2020	0% below	1% above to 8% below	2005: EO S-3-05 2006: AB32 2008: SB375 2011: EO G-11-024
	2035		1% above to 16% below	
	2050	80% below		
Oregon	2020	10% below		2007: HB3543 2009: HB2001 2010: SB1059 2011: OAR 660-044
	2035		17% to 21% below	
	2050	75% below		
Washington	2020	0% below	18% below	2007: EO 07-02 2007: SB6001 2008: HB2815 2009: EO 09-05
	2035	25% below	30% below	
	2050	50% below	50% below	

4.1.1 California

In 2005, Governor Schwarzenegger issued Executive Order S-3-05, setting the goal to reduce statewide GHGs by 2050 to 80% below 1990 levels. In 2006, the legislature passed Assembly Bill 32, the California Global Warming Solutions Act, setting the goal to reduce statewide GHGs to 1990 levels by the year 2020.

In 2008, the legislature passed Senate Bill 375, the Sustainable Communities and Climate Protection Act, directing the California Air Resources Board (CARB) to develop targets for each MPO to reduce GHGs from light-duty vehicles as a result of local actions. In 2011, after coordinating a bottom-up effort, CARB issued Executive Order G-11-024 setting achievable targets for each of California's 18 MPOs.

4.1.2 Oregon

In 2007, the legislature passed House Bill 3543, setting statewide GHG reduction goals exceeding those in California's AB32.

In 2009 and 2010, the legislature passed House Bill 2001 and Senate Bill 1059, directing the Land Conservation & Development Commission (LCDC) to set targets for MPOs to reduce GHGs from light-duty vehicles as a result of local actions. Meeting these targets, in combination with anticipated federal and state actions, would result in reductions consistent with Oregon's statewide GHG reduction goals. In 2011, LCDC adopted OAR 660-044, setting targets for each of Oregon's six MPOs. But achieving the targets is voluntary for all but the Portland MPO.

4.1.3 Washington

In 2007, Governor Gregoire issued Executive Order 07-02 and the legislature passed Senate Bill 6001, setting statewide GHG reduction goals exceeding those in California's AB32.

In 2008, the legislature passed House Bill 2815, setting statewide VMT reduction targets for light-duty vehicles. Although HB2815 directs the Department of Ecology to "convene a collaborative process to develop a set of tools and best practices to assist state, regional, and local entities in making progress towards the [targets]," the statute does not impose a requirement on MPOs. Indeed, in 2013 the Washington State Court of Appeals ruled that "the current statutory framework does not require that the [Seattle MPO] adopt a transportation plan … that achieves its proportional share of the state's goals for reducing GHGs" (Washington State Court of Appeals, 2013).

4.2 Plans

Although all three states started with similar statewide GHG reduction goals, each has taken a different policy approach to achieving those goals. For each state, the authors first describe the key aspects of planning for reducing GHG from transportation at the regional and state level. Table 3 compares regional and state planning in California, Oregon, and Washington.

4.2.1 California

At the state level, California passed specific legislation directing the California Department of Transportation (Caltrans) to plan to reduce GHGs and include scenarios into the 2040 California Transportation Plan to show how Caltrans will achieve maximum feasible emissions reductions to reach GHG reduction targets (Senate Bill 191).

At the regional level, California delegated the responsibility for reducing GHGs from the transportation sector to its 18 MPOs. Each MPO is responsible for adopting a coordinated land use and transportation plan (Sustainable Communities Strategy, or SCS) that will reduce VMT per capita and thereby reduce GHGs. Sustainable Communities Strategies are the key element in the approach. While the state Air Resources Board (CARB) sets the GHG reduction target for each MPO, the implementation strategy to achieve the target is left completely up to the MPO. SB375 is explicit in maintaining the delegation of land-use authority to local governments, and thus whether an MPO will meet its GHG reduction target depends, in part, on its ability to coordinate with local governments to implement the SCSs.

Table 3: State and regional planning framework

State	State Planning	Regional Planning
California	• Updated long-range transportation plan • No state land-use planning but guidance for local plans	• MPOs responsible for adopting plans • All MPOs must participate • Integration of climate plan (Sustainable Community Strategy) and long-range transportation plan
Oregon	• Statewide Transportation Strategy (advisory) • No update to long-range transportation plan • Statewide land-use planning program predates GHG	• MPOs responsible, but only Portland and Eugene required to do scenario planning and only Portland required to adopt scenarios
Washington	• Statewide climate action plan • Updated long-range transportation plan • Studies on growth management and climate change	• MPOs not required to be engaged (lawsuit)

4.2.2 Oregon

Oregon also relies on state and regional planning. HB2001 (2009) and SB1059 (2010) established the state's approach to reducing GHGs from transportation: 1) develop a Statewide Transportation Strategy (STS) for reducing GHGs from all modes, and 2) develop land-use and transportation scenarios for reducing GHGs from light-duty vehicles in some MPOs. In 2013, the Oregon Transportation Commission (OTC) "accepted" the Statewide Transportation Strategy, but did not formally adopt it as part of the Oregon Transportation Plan. The strategy contains 18 strategies related to vehicle and engine technology advancements; fuel technology advancements; transportation options; efficient land use; and pricing, funding, and markets. In 2014, the Oregon Department of Transportation (ODOT) detailed strategies to begin implementing the STS within two to five years. ODOT has updated several modal and topical plans to incorporate the STS (Oregon Department of Transportation, 2013). Oregon has not updated the long-range transportation plan since this legislation was passed and thus climate goals are not reflected in the plan.

At the regional level, only two MPOs have planning requirements under the law. Portland was required to complete scenario planning and adopt a scenario while Eugene-Springfield was only required to undergo scenario planning. In 2014, the Portland MPO adopted a scenario to meet its target for reducing GHGs from light-duty vehicles. Implementing this scenario will require new funding to support investments in transit, bicycling, and walking (Metro, 2014). As of 2017, no other MPOs have made significant progress towards meeting their (voluntary) targets.

4.2.3 Washington

In Washington, due to legal challenges, most planning has occurred at the state level. In 2015, the Washington State Transportation Commission released the policy-level Washington Transportation Plan 2035. The plan recommends promoting bicycling and walking as viable transportation options, and making significant progress toward meeting statewide GHG reduction goals through vehicle and fuel technology, system management and operations, land use, transportation options, and pricing strategies (Washington State Transportation Commission, 2015).

In addition to a statewide plan, Washington also conducted studies to examine how the Growth Management Act could be used to address climate change (Senate Bill 6580, 2008). But the legislature did not embrace the recommendations.

4.3 Actions

This section describes the actions each state adopted to reduce GHGs from VMT, relying on the three-legged stool framework to classify and label each action as alternative modes, pricing, or land use. The authors also note whether the action went into effect before or after climate legislation. Examples of actions include investing in multi-modal transportation, transportation demand management, technological improvements, and planning for compact development. Table 4 shows the primary state actions implemented to reduce GHGs.

Table 4: State actions to reduce GHG

State	Actions
California	• Cap-and-trade funding (land use and alternative modes) • Regulatory relief (land use) • High-speed rail (alternative modes)
Oregon	• Urban Growth Boundaries in place since 1973 (land use) • 2017 Transportation Bill expands funding for transit, bicycling and walking (alternative modes)
Washington	• State growth management program in place since 1990 (land use) • Commute Trip Reduction (transportation demand management) program in place since 1991 (alternative modes) • Expansion of mass transit independent of climate goals (alternative modes)

4.3.1 California

To implement SB375, California adopted several incentive and regulatory programs to encourage and compel implementation of SCSs. These programs primarily address alternative modes and land-use patterns. California created a mandatory cap-and-trade program based on mandatory emissions reporting from the state's largest industrial GHG emitters. Fees collected from the cap-and-trade program are used to fund the various state agencies charged with achieving GHG reduction goals. While cap-and-trade generates funding to implement policies that reduce GHGs, the program does not rely on funding from transportation and thus is not categorized as a pricing program. A large portion of funds collected from the cap-and-trade program are allocated for the implementation of SCS projects by MPOs aimed at reducing GHGs from the transportation sector (Fulton, 2015). The Strategic Growth Council is the administrator of these cap-and-trade funds and is responsible for allocating them to projects that are consistent with the SCSs through its Affordable Housing and Sustainable Communities grant program, which allows MPOs and local governments to implement projects that reduce GHGs. These projects include housing and transportation projects, which address land use and alternative modes. Land-use control is local in California, so allowing flexibility in adopting strategies in SCSs and providing grants to implement SCSs is an integral strategy. The California Legislature set aside 35% of revenue from the cap-and-trade program for SB375 projects and the state's high-speed rail program, providing funding for alternative modes (SB862, 2014).

Some actions in California rely on land-use patterns to promote density and infill. Senate Bill 743 calls for a change in the way transportation impacts are measured in the California Environmental Quality Act (CEQA) review process. The State Office of Planning and Research's draft guidelines recommend

using a VMT threshold to determine whether development requires CEQA review. If the development is near existing transit and VMT is expected to be low, the development can forego CEQA review, effectively streamlining and promoting infill development and decreasing statewide VMT. New CEQA criteria for transportation projects are meant to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses" (Cal. Public Resources Code § 21099).

Additionally, California passed legislation which exempts certain infill development projects from CEQA review (Senate Bill 226). The development project must be surrounded by 75% existing urban development, comply with an existing SCS, and meet density guidelines for residential development. When outside of an MPO boundary, developments must meet the rule's definition of a "small walkable community project" to be exempt from CEQA review.

4.3.2 Oregon

Although the state level Sustainable Transportation Strategy and regional plans include strategies for reducing GHGs by promoting investments in transit, bicycling and walking, the legislature did not fund programs to increase transit, bicycling, and walking in the eight years after HB2001 and SB1059. Oregon passed a transportation funding bill in 2017 to increase funding for transit, bicycling, and walking statewide (HB2017, 2017). Oregon is well known for a statewide land-use program that relies on urban growth boundaries which facilitate compact growth and affect land-use patterns. This program pre-dates climate legislation and has been in place since 1973. While the Statewide Transportation Strategy describes pricing as a strategy, no pricing programs have been adopted to date.

4.3.3 Washington

At the state level, the state transportation plan promotes bicycling and walking as well as pricing. But, new programs with new funding sources have not been put in place to fund these programs or implement pricing approaches.

Like Oregon, Washington has programs that reduce VMT that pre-date climate legislation. Washington's Commute Trip Reduction program aims to reduce drive-alone commute trips through employer-based programs. When first adopted in 1991, it aimed to improve air quality, reduce traffic congestion, and reduce fuel consumption; now it has the added result of reducing GHGs by reducing driving. Washington also relies on a state-level land-use program to promote compact development through the 1990 Growth Management Act.

Washington's intended centerpiece policy for reducing GHGs is to implement the cap-and-trade program that the Western Climate Initiative proposed in 2008 (Washington State Dept. of Ecology & Washington State Community, Trade and Economic Development Dept., 2008; Western Climate Initiative, 2008). However, as of 2017, it has yet to do so.

4.4 Results

Finally, the authors describe the approach for monitoring progress towards results, examining how GHGs and plans are monitored by each state. Table 5 compares state approaches to monitoring results.

Table 5: State approaches to monitoring for results

State	Actions
California	• Tracking GHGs • Lack of monitoring of plans • No feedback loop from GHG to policies
Oregon	• Oregon Global Warming Commission biennial report card • Lack of monitoring of scenarios
Washington	• Tracking levels of GHGs • No requirement to meet target

4.4.1 California

California's approach requires a certain degree of monitoring. The California Air Resources Board is required to update a Scoping Plan every five years. The Scoping Plan evaluates progress and identifies strategies for reaching GHG reduction goals. Under SB375, MPOs are required to update SCSs every four years. Although the state reviews and accepts SCSs under SB375, the statutes do not require the state or other agencies to monitor and evaluate the implementation of SCSs. While MPOs update regional transportation plans (RTPs) and SCSs every four years, there is not a systematic approach to monitoring the implementation of SCSs.

The May 2014 First Update Scoping Plan presents key accomplishments made by California thus far in reducing GHGs from all sectors, including transportation, which saw an overall decrease of 1.7% from 2000 to 2012 (California Air Resources Board, 2014). While these reductions are partly attributable to decreased driving concurrent with the economic recession of 2008, the continued decrease in GHGs from the transportation sector since its 2005 peak is poised to continue. A nearly 11 percent decrease in GHGs from the transportation sector between 2000 and 2012 points towards early success in achieving the state's ambitious overall GHG reduction goals.

4.4.2 Oregon

The Oregon Global Warming Commission (OGWC) is required to report biennially on progress in achieving the GHG reduction goals. In 2010, OGWC adopted an interim plan to achieve Oregon's goals for 2020. But because the legislature gave OGWC no statutory authority, this plan does not inform state policy (Oregon Global Warming Commission, 2010). The 2017 progress report concludes that "Oregon's GHG goals are not likely to be met with existing and planned actions." (Oregon Global Warming Commission, 2017). The report relies, in part, on a detailed biennial inventory of Oregon's GHGs (Oregon Departments of Environmental Quality, Energy, & Transportation, 2013).

The legislature did not require monitoring implementation of scenarios or reaching targets for MPOs.

4.4.3 Washington

The departments of Ecology and Commerce are required to report biennially on Washington's GHGs (HB2815). The latest report indicates a decrease in GHGs from the transportation sector, but attributes this to a weak economy. The report does not compare the progress to Washington's GHG reduction goals (Washington State Dept. of Ecology, 2014).

5 Synthesis

Though each of these states began with a common origin under the West Coast Governors' Global Warming Initiative and each state had established GHG reduction goals in statute by 2007, their approaches to reducing GHGs from transportation vary considerably. This section synthesizes information described in the individual case study sections above to illuminate key similarities and differences among case study states. This section also provides a description of key strengths and weaknesses among state approaches to reduce GHGs from transportation, based on stakeholder interviews.

All case study states established ambitious statutory goals for reducing GHGs and require some level of monitoring, although the type of progress report varies significantly across states. California and Oregon require periodic reports including GHG monitoring and progress on policy implementation. Washington simply monitors GHGs and VMT levels, but does not report on progress towards meeting goals.

The policies by which these states plan to reduce GHGs vary tremendously. California and Oregon set a different target for each MPO and delegate each responsibility for developing strategies to reduce GHGs from transportation. California and Oregon rely on land use and transportation scenario planning, although only California requires all MPOs to participate. Washington is unique in establishing VMT targets.

In assessing state approaches, specific criteria are considered: 1) overall policy framework (goal and target setting); 2) state level planning; 3) regional planning; 4) actions, and 5) monitoring results.

5.1 Policy framework

All three states adopted ambitious goals to reduce GHGs in statute. The goals vary across states, but all of these states seek to reduce statewide GHGs by 50–80% below a 1990 baseline by the year 2050. However, as Wheeler (2008) concluded in describing first generation climate action plans, the shorter-term goals are conservative. Washington and California seek to reach 1990 levels by the year 2020, while Oregon seeks a 10% reduction below 1990 levels. California and Oregon also set targets for MPOs to reduce GHGs from transportation.

Oregon and Washington stakeholders described the importance of collaboration amongst western states in adopting legislation and learning from one another. In both California and Washington, stakeholders applauded the leadership of the governor. In Oregon, the impetus for adopting climate change provisions into HB2001 was not championed by the governor or legislators but was a political push by advocacy groups, so stakeholders noted a lack of leadership or ownership over the approach.

In examining transportation-specific targets, in California, stakeholders described the effectiveness of using a performance metric to guide planning and noted that allowing MPOs flexibility in reaching targets was a key strength. Rather than mandating that MPOs implement specific policies or programs, MPOs were granted flexibility in deciding how to reach targets through a combination of transportation and land-use strategies.

5.2 State level planning

Since transportation-specific legislation was adopted, California and Washington were the only states to update long-range transportation plans (LRTPs). Oregon created the STS and Implementation Plan and has updated modal plans to be consistent with the STS, but it is unclear to what extent these plans guide investments. California is the only state that requires its DOT to illustrate how the LRTP reaches a specific GHG target. In Washington, several studies have been commissioned by the legis-

lature related to coordinating state agencies in efforts to reduce GHGs, but little policy has emerged from these studies.

After transportation-specific legislation went into effect, some California stakeholders noted improved coordination among state agencies and described a shift of culture in the state DOT related to an increased focus on GHGs, but in all states, shifting the culture of transportation agencies is slow. Other state agencies charged with overseeing or collaborating in plans and efforts to reduce GHGs note challenges in shifting the focus of DOTs. In Oregon and Washington, long-standing state-level growth management programs were a key strength described at the state level. Because one strategy for reducing VMT relies on compact development, having state-level growth management programs set the states up for success in making progress towards goals. But, in California, the lack of state-level growth management was seen as a key obstacle in making progress towards goals.

5.3 Regional planning

California and Oregon delegate some responsibility for reaching GHG reduction goals to MPOs. In Washington, HB2815 establishes statewide targets, but these are voluntary at the metropolitan and local levels (Michele, n.d). California requires all MPOs to create SCSs and integrate SCSs with RTPs. In Oregon, only the Portland and Eugene MPOs were required to conduct scenario planning and only the Portland MPO was required to adopt and implement the preferred scenario. Thus, comprehensiveness varies across states.

In describing key strengths, several stakeholders in California and Oregon noted that MPOs were a logical focus for undertaking planning. But California's MPOs and the Portland MPO have more authority than is typical. In California, several stakeholders described improved models and plans coordination as a result of the requirements of SB375. In Oregon, requiring Portland to adopt a plan and making the process voluntary for other MPOs was seen as a good way to provide an example to other MPOs and show that goals could be met by implementing current plans. However, this means that progress in Oregon has been confined to the Portland area. While the Eugene and Corvallis MPOs have taken some steps, neither has adopted a plan for reducing GHGs from transportation. Though all MPOs in California must participate, the process does not adequately recognize that MPOs vary in planning capacity. Further, because MPO boards are controlled by local officials, gaining buy-in from some MPOs has been challenging. In both California and Oregon, several stakeholders described how there was not enough funding set aside for planning. In Washington, there is no comprehensive approach to addressing GHGs in metropolitan plans, and only the Seattle MPO has voluntarily embedded reducing GHGs into its plans (Puget Sound Regional Council, 2010).

5.4 Actions

Implementation mechanisms (actions) adopted by states have varied considerably. Only California has adopted new legislation and policies aimed at implementing SB375. In Oregon and Washington, programs that predate GHG legislation like Oregon's urban growth boundaries (UGBs) and Washington's Commute Trip Reduction serve as key elements in the approach. In Oregon, Portland's Climate Smart Communities planning effort found that implementing existing transportation plans would achieve the GHG reduction targets, but there is insufficient funding to do so.

Unrelated to GHG legislation, Washington is making investments in mass transit expansion. California is investing in high-speed rail and offering competitive funding for SB375 implementation through cap-and-trade funds. However, the lack of funding was overwhelmingly the most discussed obstacle in all states. Even in states making investments, there was not enough funding, funding sources are

often constrained, and states and MPOs must balance needs for maintenance with expansion of transit. In California, stakeholders offered some examples of jurisdictions that changed the transportation project prioritization process, but overall noted that there seems to be a time lag in shifting RTP funding, likely owing to the sometimes decades-long project time frame in transportation planning.

5.5 Monitoring and results

All three states rely on tracking the levels of GHGs and VMT to monitor progress towards goals. California and Oregon require reports that evaluate progress towards goals and describe implementation mechanisms like policies, programs, and incentives. Both California and Oregon revise targets on a periodic basis. California is unique in requiring periodic updates of MPO plans to reduce GHGs from transportation. Washington develops regular GHG inventories, but there is no requirement to describe policy implementation to the legislature or executive on an ongoing basis. Often GHG tracking occurs within an environmental agency while the actions that affect GHGs emerge from state, regional, and local transportation agencies. While states are generally on track to reach 2020 goals, progress to date is partially attributed to high gas prices and high unemployment during the Great Recession. Recent VMT data raise questions about the longevity of recent trends (U.S. Federal Highway Administration, 2015).

Though states are tracking levels of GHGs and VMT, states are not monitoring the implementation of plans to examine whether policies and programs are having their intended effects and whether transportation choices and land-use patterns are shifting as a result. No state has a comprehensive monitoring program in place. In California, CARB is a strong agency and is given responsibility for approving MPO plans, but has no role in tracking implementation. MPOs have to show that adopted plans will meet targets but are not held accountable for actually reaching the targets. In Oregon, OGWC publishes biennial report cards but has no real oversight or authority. In Washington, state agencies are required to report biennially on Washington's GHGs.

6 Discussion

This study describes efforts of three innovative West Coast states to mitigate GHGs from the transportation sector. With the impetus of the West Coast Governors' Global Warming Initiative, California, Oregon, and Washington adopted GHG reduction goals into statute. While this study focuses explicitly on transportation, these states have been leaders in adopting a broad range of plans and policies to reduce GHGs across sectors. Each state adopted legislation focused on GHGs from transportation, though the approach varies by state. This section integrates the document analysis with findings from stakeholder interviews to convey findings and recommendations.

This study describes the key similarities and differences between state approaches to reduce GHGs from transportation. Distinguishing elements of state approaches include:

- California and Oregon set GHG reduction targets for each MPO, but California is the only state that requires all MPOs to show how they will reach targets.
- Washington is the only state that sets VMT reduction targets.
- California and Oregon require that DOTs illustrate how the state will reach GHG targets.
- California provides cap-and-trade funding and uses regulatory relief to incentivize implementation.
- All states require periodic GHG inventories and California and Oregon require periodic reports.
- No states consistently monitor implementation of plans to examine how policies impact GHGs,

This study relies on over 30 interviews from stakeholders representing state agencies, MPOs, and nonprofit groups to assess strengths and weaknesses of state's approaches to reducing GHGs from transportation. Findings and recommendations are organized along dimensions including planning, implementation mechanisms (actions), and monitoring (results) in the following set of tables in alignment with the conceptual framework listed above. In each table, a recommendation is provided alongside a finding and the authors suggest who could adopt the recommendation and, if applicable, a model jurisdiction from the case study states.

Table 6 conveys findings and recommendations related to planning process. One way to use MPOs to reduce GHGs is to integrate regional transportation plans (RTPs) with plans to reduce GHGs, as California did with SB375. Requiring MPOs to integrate RTPs with plans to reduce GHGs can be an effective tool, if MPOs have authority over project selection. Relying on RTPs is effective in California because MPOs have a high level of oversight over project selection. This is a shift that could emerge from the federal level as a requirement for receiving federal funding, but could be implemented at the state level as well. Further, states should require performance measures related to GHGs and other metrics in the transportation project selection process.

Because MPOs vary in capacity, it is important to provide technical support and funding for planning, especially in smaller MPOs. This is particularly true in California where MPOs range drastically in size, but was true in Oregon as well where MPOs have not chosen to voluntarily engage in scenario planning because of the lack of funding.

Table 6: Planning process findings and recommendations

Finding	Recommendation	Who?	Model
Integrate RTPs with plans to reduce GHGs	Require MPOs to show how RTPs reduce GHGs and give MPOs oversight over project selection	Federal agencies: State agencies	California
MPOs vary in capacity	Provide technical and financial support for planning, particularly for small MPOs	State agencies	Oregon; California

Table 7 presents findings and recommendations related to implementation mechanisms. State authority over land-use planning offers an opportunity to encourage compact development to reduce VMT, but MPOs can use incentives (or hold back funding for transportation) to persuade locals to participate. States must work within the existing land-use policy framework, as strengthening the state role is unlikely in many states. In Oregon, statewide planning was seen as very strong. In California many stakeholders wished for stronger state land-use authority. In states without strong state control over land use (like Oregon and Washington), states could make the provision of transportation funding contingent on approval of land-use plans focused on compact development to reduce GHGs. States can use incentives or holdbacks to incentivize planning to reduce GHGs. This could be an important lever for local implementation, particularly in states like California that lack a strong state land-use program. In states with strong land-use planning like Oregon, the state could make land-use plan revision or urban growth area/boundary expansion contingent on engaging in scenario planning to reduce GHGs.

States and MPOs lack flexible funding sources to implement plans. Constitutional restrictions on gas tax proceeds limits the amount of funding available for transit and bicycle or pedestrian projects. The Portland MPO found that existing plans would reach GHG targets, but the region lacked funding to be able to implement plans. The authors recommend removing constitutional and statutory limitations on the use of transportation revenue sources to expand funding for transit, bicycle, and pedestrian modes.

Table 7: Implementation findings and recommendations

Finding	Recommendation	Who?	Model
State authority over land use provides an opportunity to encourage compact development	Make provision of transportation funding contingent on approval of land-use plans focused on compact development. In states with strong land-use planning, make boundary expansion contingent on scenario planning	State agencies	N/A
Lacking flexible funding sources to implement plans	Remove constitutional limitations on gas tax	Legislature	N/A
Cap-and-trade funding provides flexible funding source to implement plans	Encourage competitive cap-and-trade programs or carbon taxes to implement plans and projects	Legislature	California
Regulations prevent compact development	Relax regulations to incentivize compact development, bicycle/pedestrian infrastructure and transit infrastructure	Legislature	California

Cap-and-trade programs can provide a flexible funding source to implement plans. California provides an example of using competitive cap-and-trade funding to implement plans and projects. Other states can turn to cap-and-trade or carbon taxes to generate funding for implementing plans through a competitive funding process.

When funding is not available, states can relax regulations to incentivize compact development and bicycle, pedestrian, and transit infrastructure. California provides an example of relaxing regulations to encourage infill.

Table 8 presents findings and recommendations related to monitoring and enforcement. Monitoring was relatively weak in all states. No states have developed a mechanism that allows for a feedback loop between goals, actions, and results. States need an agency with authority and staff to provide oversight and monitoring of implementation of plans. Oregon created a Global Warming Commission to oversee GHG reduction efforts but failed to provide adequate legislative authority or staff.

It is essential to hold MPOs accountable for targets. For example, in Washington a court ruled that the statewide targets to reduce VMT did impose a requirement on MPOs to reduce VMT (Washington State Court of Appeals, 2013). California and Oregon's practice of disaggregating statewide goals into regional targets is a good approach.

Table 8: Monitoring findings and recommendations

Finding	Recommendation	Who?	Model
States lack institutional structure to provide oversight of implementation of plans	Provide monitoring and enforcement to state agency with staff, funding, authority	Legislature	N/A
Need to hold MPOs accountable	Track VMT and GHG at MPO level	State agencies	California; Oregon
Plans are not monitored for implementation	Rely on public sector or civic sector to monitor plans.	State agencies; Civic sector	California

Although MPOs are required to show that plans will meet long-range targets in California and Portland, the states do not monitor plans for implementation. MPOs have to say how they plan to reduce GHGs, but no states track whether they are actually implementing the policies laid out. Tracking implementation would provide a tighter feedback loop between goals, efforts, and results. ClimatePlan in California offers an example of the civic sector undertaking plan monitoring outside of state requirements. States should fund the civic sector to complete these evaluations to provide an outside perspective on implementation.

Another way to encourage monitoring and enforcement is to foster regional and local support for plans and policies. States and MPOs can build broad public support for actions that reduce GHGs from transportation by emphasizing concurrent benefits such as sustainable economic development, public health, reduced congestion, and greater accessibility.

7 Lessons learned

The states examined are unique in adopting statutory GHG reduction goals and legislation targeting the transportation sector. In each of these states, there is public support and political will for climate change policy. While many recommendations are conceptually simple, it is important to acknowledge the political context and plan for continuity when adopting legislation to reduce GHGs from transportation. States must go further than requiring scenario planning and consider funding and regulations to implement plans. While national climate legislation is lacking, these states are exemplars in adopting state-level legislation to reduce GHGs from transportation. In these states, the initial legislation setting goals and requiring plans to determine how goals will be met is a starting place for making progress towards reducing GHGs from transportation. But this research finds that sustained leadership from the executive and legislative branches coupled with momentum on common legislation and policies are key components of a successful implementation approach. In states (like California) where the governor or legislature took ownership over legislation, implementation has been strong and consistent. In states where the executive and legislature did not take ownership over the programs and the players are changing, focus has waned since legislation went into effect. Though scenario planning models and resulting plans are improving, plans will not be successful without adequate funding for implementation and a reorientation of status quo transportation funding. In an era when transportation funds are sparse and several funding sources are constitutionally or statutorily constrained, finding adequate funding for plans designed to reduce GHGs is a major obstacle. Though these states possess general public support for climate change policies, it can be difficult to gain enough support to reverse ingrained policies and institutions that encourage driving.

However, several stakeholders talked about how selling the public on GHG reduction efforts were more successful when framed in a discussion of "co-benefits." By describing the benefits related to public health, walkable communities, and affordable housing that occur when reducing GHGs, it is easier to get public buy-in while broadening the focus beyond just climate change.

In adopting policies, environmental groups have been important players in pushing legislation and sustaining emphasis on implementation. In California and Washington, environmental groups have filed lawsuits against MPOs related to their responsibilities under state law. In crafting a policy designed to reduce GHGs, it was logical to rely on MPOs and allow for flexibility to reach targets. In monitoring progress, states currently lack strong oversight over implementation. While state agencies are involved in target setting and plan approval, there is little oversight of the plans once adopted. Providing authority, budget, and staff to an agency charged with oversight could improve the monitoring of plans.

Authors examined state efforts to integrate climate, transportation, and land-use planning in three West Coast states. The states examined are progressive in adopting statutory GHG reduction goals and

legislation that focuses on the transportation sector. Overall, in the absence of a national framework for combating climate change, states have stepped up to adopt innovative policy that goes beyond federal policy. While the authors note the need for a national (or international) framework for combating climate change, efforts to reduce VMT can and must occur at the metropolitan and state levels and need not wait for national leadership.

While innovative states have showed a pathway for other states in establishing policy frameworks that may mitigate transportation emissions, many of the state level frameworks examined here were put into place at the height of the recession. Thus, though preliminary emissions measurements show a reduction in VMT and GHGs, it is unclear whether these trends will be sustained or whether reductions are attributed to the Great Recession or policy change. At this point, it is highly uncertain that states will be able to meet long-range targets. After the low-hanging fruit is picked, more radical policy innovation will be needed in the future.

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